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July 17, 1930

Engineering News-Record

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Hydraulic-Fill Levee Construction on the Mississippi
Reliability of Cold-Drawn Bridge Wire Assured by Tests
Piledriving Through Caisson Walls
Securing Rigid Bases for Core Drills
Tests Compare Beam and Control-Cylinder Stresses
Pavement Curing Methods Compared
Decorative Effects Obtained With Concrete
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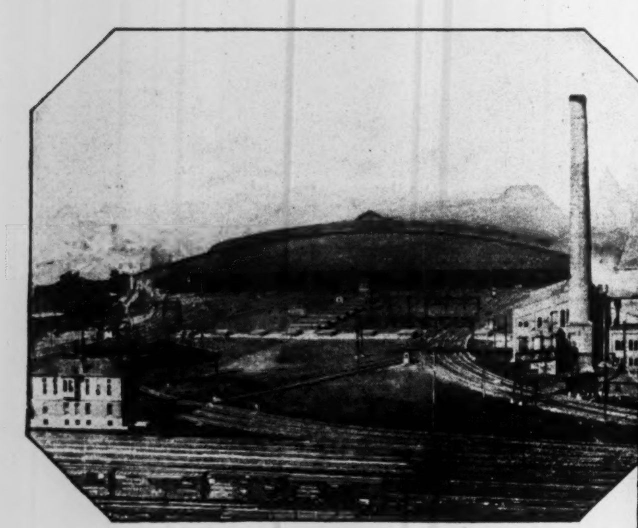

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at St. Louis

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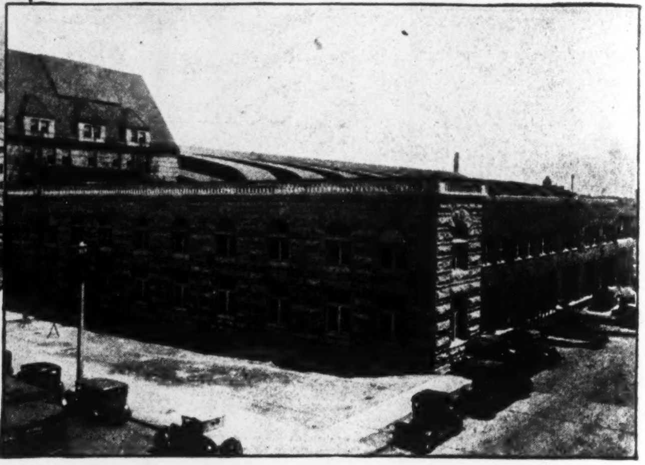

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. Schmitt, *Editor*

Volume 105 NEW YORK, JULY 17, 1930 Number 3

No Parking in San Francisco

FOR SOME TIME traffic engineers have had their eyes on San Francisco street-traffic conditions, not only because of the intricate street pattern but on account of the fact that slowly the increasing density of traffic is reaching saturation of facilities. On another page is noted a report from the traffic engineer which indicates an increase of 20,000 vehicles entering the central business district over the 80,000 reported a bare two years ago (*Engineering News-Record,* Oct. 11, 1928, p. 536). The engineer points out that stagnation and eventual decay are not remote contingencies if parking continues much longer. Despite this municipal problem staring the city in the face, however, the officials have recently chosen to do away with the traffic engineer, their greatest hope of solving the problem of providing terminal facilities and the means of rapid and safe circulation of vehicles. When Chicago adopted the no-parking rule, warnings were given that smaller cities should not follow her example without exhaustive engineering research. Apparently San Francisco proposes to wait the test of stagnation and decay.

Expediting Street Traffic

TRAFFIC signal systems are as important as parking control in expediting the movement of vehicles and pedestrians along the street, and call for the same degree of hard sense in their application. Engineering principles govern, and they need to be so used as to bring about maximum flow volume and speed of movement. For years New York has used long-interval signals—north-south traffic moving for about two minutes and east-west traffic for one minute—with results that are quite disastrous to traffic efficiency. Crosstown movement is placed under intolerable disadvantage, and pedestrians are forced to complete disregard of signals, with results as harmful to traffic flow as to their own safety. Pedestrian intervals of four-way red lights are now proposed to relieve part of the difficulty, but this is unlikely to reduce the heavy tax on police service which the long cycle makes necessary—three to five officers per intersection in the most congested districts. A short cycle is the only lasting cure. The survival of the old long-cycle practice is one result of making traffic control a police matter instead of an engineering operation.

Airport Fire Risks

A SERIOUS fire which recently destroyed two hangars and several dozen planes at the Chicago municipal airport brought out sharply the need for careful study of fire hazards at airports. A spark, a flash of exploding gas, and in a moment one hangar was enveloped in flames which quickly spread to the adjoining one. To add to the confusion the fire soon disabled the lighting system, throwing the airport into darkness, including the lights upon which night fliers depend for safety in landing. Does not this greatest of airport fires bring with it at least two lessons for airport designers? First, the need for a study of the size of hangars at airports, balancing the economy of large size against the increase in risk of loss of contents, and a study of methods of isolating hangars one from another; and, second, means of safeguarding the lighting system against sudden disablement. It seems obvious that lighting control panels and other operating facilities should be so situated as to be independent of fire in a hangar; also that the boundary and other field lights should have two sources of supply, the one automatically controlled so that it will come on the instant the normal supply fails. Airport design is in its infancy; like a child it should learn from its early falls.

Flame-Cutting Again

RESULTS of tests of flame-cut steel parts published in this issue traverse the unfavorable conclusions recently drawn by Columbia University experimenters as to the service value of flame-cutting. The experimenters in question claimed to have shown embrittlement of steel flame-cut after punching, though this claim was based on conflicting and inadequate evidence, as we indicated in a brief discussion at the time (April 24, 1930, p. 674). The Detroit tests show satisfactory ductility, to all appearance equal to that of metal cut under other conditions. They go far to discredit the Columbia tests and to establish that for the present flame-cutting may be regarded as unobjectionable when the metal is good. Additional investigation is plainly desirable, however, to bring further evidence to bear on the question. Structural steel of standard grade is subject to variations of composition and structure which influence its toughness and modify the effect of various types of working by mechanical processes and by heat. Until these effects are more fully known than now, numerous questions of importance to structural engineering development must remain unanswered. Fuller study of flame-cutting will supply some of this information.

Inspecting Structures in Service

SEVERAL failures of old buildings were reported in the last few weeks. They bear heavily on the matter of assuring continued safety of structures in service by careful inspection. When a warehouse suddenly collapses, or the supports of a roof tank give way, the occurrence points to elements of deterioration which in all probability would have been detected by inspection. Increasing age brings increasing risk, especially in frame or composite buildings. It brings also increasing difficulty in discovering defects; alterations are obscured by subsequent alterations and dust, dirt and accumulations of old paint screen growing defects. Some years ago the near collapse of an old enginehouse was discovered when the roof framing covered with years' accumulations of soot was washed down with a hose and whitewashed. Failure of the mortise pins and a slow slipping of the tenons from the mortises had gone unnoticed in the frequent inspections to which the building was subjected, because of their thick cover of soot. Not only must our old buildings be subjected to periodic inspections but they must be subjected to *thorough* inspections intelligently directed. Only thus will their defects be sure to be revealed.

Hydraulic-Fill Levees

A REVIEW of the article in this issue on hydraulic-fill levee construction with dredges indicates clearly the wisdom of appraising present construction requirements in the light of a new medium for moving earth into levee embankments. The levees on the Mississippi are now planned with very close restrictions on borrowpit depths and locations, and there is a virtual requirement that the levee be completed to full height in a continuous operation; under these conditions the most efficient use of hydraulic dredges is hampered. It is true that they have met demands with remarkable success, as measured by prices bid and performance guaranteed; but neither the bids nor the guarantee have realized the expectations of profit and performance which prompted them. No doubt future hydraulic-dredge levee work will be more wisely priced—perhaps not higher, because dredge operators have perfected their practices with experience, but certainly not at figures which recklessly cut under those of dry excavation and embankment. If the generally cheaper prices which hydraulic-fill construction can reasonably be expected to promise are to be realized, the levee work has to be planned for wet methods. How this may be done is discussed in the article in this issue; it is well worth while to give this discussion and the problem which prompted it careful consideration.

Profession and Super-Profession

WITH ALMOST sensational emphasis the Cleveland meeting of the civil engineers brings to the fore the old question of the engineer's professional status. When so skilled a practician as President Coleman and so able a diagnostician as Professor Wickenden simultaneously direct their thoughts to it, the subject is obviously in a place of prominence. The dual discussion gives every member of the professional group reason for serious reflection, and reason also for considering Professor Wickenden's suggestion that a super-profession be established in order to cure present ills.

The question is an old one. No doubt everyone who turns his mind back two, three or more decades will recall earlier agitation over the engineer's professional status. But it is nevertheless a new question in some weighty particulars: in the greatly increased number of engineers, in the almost complete sway of technical college training as method of entrance to the professional ranks, and in the wide currency of state licensing. The greater number of engineers, and also their differentiation, intensify the difficulty of assigning to them a specific group of functions. But on the other hand the universality of college-degree qualifications lightens the task, as compared with the days when many engineers were self-made. Licensing, young and as yet virtually unapplied, creates a new condition whose ultimate possibilities remain to be explored. Meanwhile the question of a recognized professional status is seen to be urgent, for under present conditions it has been possible for architects to make a surreptitious assault on a group of engineers with intent to deprive them of their work.

In these premises Professor Wickenden offers the plan of creating a select grade of "certified" engineers, certified as veterans in experience and performance. This class, he indicates, is to be set up by the unaided action of the "major engineering societies" (Query: what is a major engineering society?). Just what is to be accomplished by setting up such a superclass, in the direction of correcting present difficulties of the profession, is not made clear. But it seems to be the spirit of the proposal that the engineers so certified by their societies shall constitute the legally recognized profession, all others to be in the eyes of the law mere hewers of wood and drawers of water. Indeed, in the brilliant portrayal with which he led up to the specific proposal, Professor Wickenden dwelt on how engineers are "surrounded by hosts of draftsmen, detail designers" and others. We call particular attention to this phrasing because we dissent from its invidious connotation; the work of these draftsmen and detail designers is usually a significant and determinative element of engineering planning.

About fifteen years ago an earlier proposal for similar grouping of engineers into a higher and a lower class acquired some temporary notoriety. It was urged that an Academy of Engineers be set up by Congress, and bills to bring about its creation on a self-perpetuating basis were actually introduced. It failed because its purposes were purely decorative, and because the implied objective of having this corona of distinguished men represent the whole profession in public matters was bound to lack appeal to practical statesmen. Comparison of this older scheme with the new proposal is not inappropriate despite their well-marked differences, for both give expression to a conviction that the *many* of the engineering profession are to be looked upon with doubt and question, while only the *few* should be accredited to the public whom the profession serves. In fact, Professor Wickenden goes so far as to ask: "Is our attempt at extreme democracy worth its cost?"

We doubt whether the salvation of the engineering profession is to be sought in the direction of caste segregation. We suspect that it is to be sought rather through sharper definition of minimum of equipment which alone shall entitle its possessor to claim the title and perform the functions of engineer. A broader but more exigent democracy, in other words, rather than a special aristocracy, is the objective. When the name *engineer* has been made to assure that its possessor has at least a prescribed amount of technical educational qualification, our present problem will shrink to small proportion.

It is well to bear in mind amid all the arguments pro and con that the profession of engineering does exist, in unmistakable reality; that it includes many branches, distinct yet intimately related; and that the growth of any branch and its advance to greater achievement depend more on inner excellence than on badge or symbol. If, for reason of better service to the public, all or any department of the engineering profession finds it necessary to have a characteristic name and to eliminate unqualified interlopers by aid of law, as through licensing.

it is useful assistance, whose value must in time appear. But the engineer's essential standing as a professional man depends mainly on himself and his performance.

Considerations on Pavement Smoothness

THE SCRUPULOUS consideration by modern highway engineering of nicety of workmanship in pavement construction is exemplified in a manner worthy of notice in two recent items emanating from the state highway department of California. In the record of state highway work published in the latest department bulletin, great stress is placed on assigning personal credit for exceptional performance. Again, the article on methods of securing a superfine road surface which we published last week emphasized refinement of workmanship.

All such public recognition of exceptional performance of highway department employees invites strong approval. The California department bulletin cites, in the case of concrete road work, the names of the resident engineers and the contractors having the best records for smoothness, for average concrete strength, for cement control and for daily yardage. Similarly, in asphaltic concrete work credit is assigned for smoothness, for the best hand-finished job, for density of pavement surface and for production. Then in tabulations covering all concrete and asphaltic concrete road work the figures for smoothness, strength and other qualities are given with the names of the engineer and contractor and types of mixer and finishing machine employed.

Beyond the fact that these records show constant progress in the quality of pavement construction, their value lies in their encouragement of fine workmanship. It is a nearly universal fault of public-works personnel management that only within the bureau directly involved, and there only in an incidental way, is special quality of performance by the designers and constructors known or appreciated. In inaugurating the publication of performance records and credits, California sets an example to which other state highway departments can well give consideration as a possibility in developing their staff loyalty and pride in work performed.

In reviewing these records, and in particular the meticulous care bestowed on the finishing of the concrete pavement described last week, the query is raised whether it is all justified—whether roadbuilders are not stressing a construction perfection which is largely ephemeral. The fact is that pavement smoothness does more than serve the personal comfort of those who use the highways, for it decreases the hazard to the structure from traffic. Roughness causes impact which tends to break up the pavement and rapidly reduces its value to the user. Thus there is sound reason for pavement smoothness.

A further question arises here. Is the high degree of smoothness of the original construction retained for any length of time? Are pavement structures strong enough that in one, two or five years they will have retained a large measure of the fine smoothness incorporated in the original structure? Progressive roughometer readings for half a decade would be immensely more interesting and instructive than a single one made when the pavement was fresh from the builders' hands. It would, one is confident, disclose that pavements need to have smoothness more permanently built into them.

Anybody's Money

A PRECEDENT established when the Mississippi flood-control act was written is beginning to bear fruit. The rivers and harbors bill recently passed by Congress provides funds for flood protection on Lake Okeechobee in Florida, an undertaking heretofore considered to be of purely local concern. Thus federal funds are again allocated to local work.

These increasing demands upon the federal treasury cannot be viewed with equanimity when one realizes where such a policy of unrestricted expenditures may lead. In former years when the government provided money for levee construction on the Mississippi River, the fact that such work was for flood protection, in part at least, was recognized by the provision that local interests bear a portion of the cost of the levee construction. That principle was abandoned when the government undertook the present flood-control work in the lower Mississippi Valley, largely on the theory that the floodwater came from other states than those affected by their overflow and that consequently the other states should assist in controlling them.

Considering all the facts, there is some obvious justification for such an attitude in the case of a river of the magnitude of the Mississippi. But when the question was first raised it did not seem desirable to many that the theory of local contribution for a local benefit should be entirely abandoned even in cases where the damage and suffering was of the magnitude of that in the lower Mississippi Valley, because once the opposite principle becomes established there is no bar against bringing great pressure upon the members of Congress for the expenditure of unlimited amounts for local benefits.

Presumably the antiquated theory of aiding interstate commerce is the ostensible reason why the government is now about to embark upon levee construction on Lake Okeechobee. It can, in like manner, contribute to any other flood-protection work throughout the country under the same theory because it was long ago established that any construction work, even on the non-navigable section of a river which would affect the flow of the stream, must be considered as affecting the navigability of the lower region of the stream and so be subject to federal control. This construction of the law has been restated by the attorney-general within the last few days in ruling as to the federal government's control over the construction of a dam above Cumberland Falls. It is obvious how wide open this construction of the law sets the door to raids upon the federal treasury for local work.

It is high time that Congress took the subject under fundamental consideration and set up new safeguards against misuse of public money for local purposes. That the government will carry out flood-control work on navigable rivers under the guise of improving their navigability, or even assist in the work, destroys every principle of local autonomy and responsibility and works serious injustice to those who must provide the money for the government's expenditures. Unless a vast new pork barrel is to be created, Congress must set up a policy which will either leave flood control to local authorities or else provide an equitable, countrywide principle, as applicable to flood-swept Vermont as to the marshes of the Everglades. And while it has the work in hand, Congress should discard the present pretense of doing flood-control work in the aid of navigation. Let the work pass frankly for what it is, the protection of life, health and property.

Hydraulic-Fill Levee Construction on the Mississippi—I

A Study of Dredge Design and Equipment, Behavior of Delta Soils, Water Supply to Inshore Pits, Maneuvering Dredges Between River and Pit and Design of Levees for Economical Hydraulic-Fill Construction Based on Two Years' Levee Work in the Middle Delta Region

By John R. Wilbanks
Wilbanks & Pierce, Dredging Contractors, Rosedale, Miss.

Introduction

THE longer time which the floodwaters of the Mississippi River now remain standing against the levees not only indicates the necessity for higher and larger structures, but prompts the consideration of building them as stable as dams.

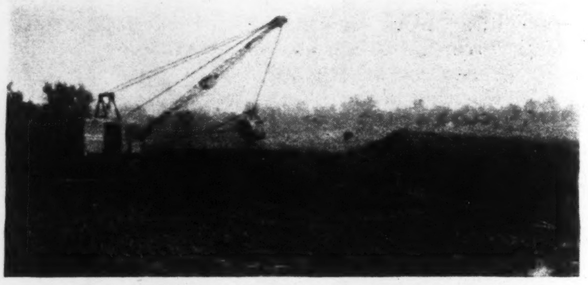
In building earth dams it is generally admitted that the wet-and-rolled, puddled-core and hydraulic-fill methods are about equal in quality. For many reasons it is apparent that along the Mississippi River hydraulic fill is by far the cheapest of the three methods. The entire alluvial deposit in the valley was placed hydraulically by nature and the hydraulic method is therefore the most logical way to rehandle it. Having such ideal material to pump, and not being interfered with by high water or weather conditions, dredges can work continuously throughout the year. The cheap transportation of materials through pipe lines and the opportunity to select the best material for the levee, with other minor advantages, point the way for the economic development of this method of construction.

The information from which these articles have been prepared was gathered during hydraulic construction on the Arcadia New Loop levee near Onward, Miss., the Riverton New Loop levee near Rosedale, Miss., and the Black Bayou levee enlargement near Winterville, Miss. All of these operations are in the Vicksburg district and have been under the supervision of the engineers of that district.

* * *

THE process of building a hydraulic-fill levee with the material available along the Mississippi below Cairo involves putting up two retaining dikes by draglines or other dry land equipment; filling in between the dikes with material pumped by a suction dredge; putting up further dikes and filling in again if a second or third lift is required (as when the hydraulically placed material takes a flat slope or the levee height required is higher), and finally topping off the levee by any one of a number of methods. Among these methods are: dragging up the excess material from the shoulders with draglines; hauling up the material with tractors and wagons or similar equipment; and topping out with a long-boom dragline working at the groundlevel and taking material from the borrowpit.

Some of the special considerations when contemplating the use of small hydraulic suction dredges in levee building are: (*a*) getting the dredge onto and off the work; (*b*) water supply for the flotation of dredges during operations and to take care of seepage and evaporation; (*c*) materials and their behavior in digging and placing; and (*d*) topping the narrow portion of the top of the levee where it is impracticable to pump.



DRAGLINE THROWING UP DIKES ON DRIED HYDRAULIC FILL

It is necessary that small dredges shall be brought relatively close to their work. On account of the lower friction loss in large-diameter pipe lines only a large dredge can pump long distances economically. The small dredge, on the other hand, has to be taken close to the work, and has to pump through relatively short lines. Under these conditions the small machine can put dredge material into the levee at low unit costs. Moreover it is much easier to control and handle the flow from the smaller pipe line. This is an item of great importance when pumping between retaining dikes.

Getting the smaller-size equipment on and off the job has been found to be fairly easy. This is particularly true if the work can be so scheduled as to take advantage of high water stages. On two of the jobs on which the levee-building method herein described has been used, a new levee or loop was to be built behind an existing levee. The loop, of course, joins the old levee at the ends, but for the greater part of its length it lies at a considerable distance from it.

In putting the dredge onto the job at the Arcadia loop, the process was as follows: The dredge was floated up to the old levee on a rise of the river. A bed for docking the dredge was prepared just outside the toe of the existing levee by leveling the ground off with the dredge cutter. On the lowering stage the dredge was allowed to set on this bed, and after the water had gone down a dragline dike was thrown up around the dredge with the ends tying onto the levee. A similar dike was built inside the levee and the levee cut down to its base with a dragline. Water was then pumped from the river, several hundred feet away, and the area inside the dike was filled, floating the dredge. It was then towed through the levee, the water level was lowered and the dredge started digging in the borrowpit back of the old levee.

The gap in the old levee was not closed until after the dredging was finished and the dredge was floated outside, as a very low stage of the river prevailed while the new work was in progress. While the dredge was being taken back into the river the stage of the river was 23 ft. below the level of the water in the borrowpit and about 28 ft. below the level of the base of the levee. A dragline ditch wide enough to float the dredge was dug out to the sloping river bank and the dredge was towed out to that point and locked down to the river level through two steps. The dragline used on this work had a 45-ft. boom and a 1-yd. bucket.

In taking the floating equipment onto the Rosedale job, a basin long enough to float the two dredges used on that work was cut into the riverbank by means of a 55-ft. boom dragline using a 1¼-yd. bucket. A second basin at a higher elevation was dug ahead of the lower one. It was planned to bring the dredges up in two steps but a fortunate rise of the river put the dredges up into the second basin. A dam was thrown across behind them and the basin was pumped full. The dredges were floated from this second basin through three-quarters of a mile of old borrowpit paralleling an abandoned levee spur, up to the base of the levee itself. The levee in the meantime had been cut through with the dragline, following a fall in the river stage, and the dredges were floated through the cut and into a basin behind the levee formed by an existing low sub-levee. The main levee was immediately refilled. The pool level between the levee and the sub-levee was lowered, the sub-levee was cut at a point where an old drainage ditch led away from it and the dredges were floated through the ditch half a mile to the point where the ditch crossed the line of the new levee loop to be built. After the completion of the Rosedale job just a year later, the equipment was taken through the levee by the reverse of the above-mentioned process. The dredges were allowed to remain for three weeks while being overhauled and were floated out to the river on the January high water. They were then towed down the river directly to the Black Bayou job where they were placed in the old borrowpit outside the levee. They are now engaged in riverside enlargement at that point.

To take a dredge through a levee requires about a week, from the time cutting of the levee starts until it is refilled. This is based on the use of two dragline machines of 1- and 1¼-yd. capacity respectively, and the cutting of a 26-ft. levee. Special permission must be secured from the government engineers to cut the levee. It is given only when the river is below its banks, and in the Vicksburg district, when there is a falling stage upstream as far as Cairo. A period of ten days is allowed for the process from the time the levee is cut until it is refilled, and this length of time is sufficient.

The experience so far gained shows that it is not difficult or expensive to take a suction dredge onto and off a job through an existing levee. This is particularly true if advantage can be taken of high water stages. It is far less expensive, even when the process of locking up or down has to be used, to get the dredge up out of or down into the river than it is to dismantle a dredge, moving it onto a job in sections and reassembling it on the job. It should be borne in mind, however, that the dredge hull should be very strongly built, as it is sometimes necessary to set the dredge aground in the process, and there is a possibility of grounding it on an uneven surface and of warping the hull.

Maintaining Flotation in Dredge Pool

It was thought that maintaining a pool of water in the dredge borrowpit might be a difficult matter, especially when working in sandy soil. However, it has so far proved to be both simple and inexpensive.

On the Arcadia job the borrowpit was about 700 ft. from the riverbank at its closest point. The material was a very fine silty sand. The riverbanks on a lowering stage of the river water showed a considerable amount of seepage. As the Arcadia job was the first one of this nature undertaken, the choice of pumping equipment was somewhat a matter of experiment. As a start, a low-lift, open-valve, 6-in. centrifugal pump driven with a Fordson tractor was chosen. This proved adequate for the work. In extreme dry weather it was run day and night for a short time, but for most of the time only day operation was necessary.

Without doubt the main cause of the low seepage loss through the sandy soil was the fact that the return water flowing back into the pit from the hydraulic fill carried a heavy load of silt. This settled on the sides and bottom of the borrowpit and sealed it.

On the Rosedale job it was not necessary to pump any water from the river to maintain borrowpit pool elevation. When the dredges were brought in, enough water flowed in from the pool outside the levee to float the dredges in and to start the work. Thereafter the rainfall on an area 2 miles long and an average width of about half a mile, and seepage under the old levee from the river which held at a high stage throughout the spring of 1929, furnished an ample water supply. The north half of the job had a ground elevation several feet higher than the pool which covered the lower part, and to keep the water level as high as possible in the north half, in order to furnish good operating conditions, an 8-in. pump driven by a Fordson tractor was used for about a month to pump from the lower pool. The pump was run about half the time. The pool formed was about 6,000 ft. long, with an average width of about 250 ft. Two-thirds of the distance was in clay and buckshot and the remainder was in fine sand only a few hundred feet from the river.

Judging from the experience gained on the two jobs on which this article is based and on other dredging operations which have since started on the river, it does not seem probable that the maintenance of an adequate water supply will ever be a serious problem for the hydraulic dredge operator so long as there is enough silt in return water to act as a seal. In order to take care of extreme conditions, a 12-in. centrifugal pump driven by a diesel engine with enough power to pump against a 50-ft. head probably would be adequate. This should be permanently mounted on a barge. This equipment would be very useful in furnishing the flotation water supply necessary in cutting into and off a job.

Character and Behavior of Materials

There is a wide variation in the character of the material encountered and in its behavior at the end of the pipe line. There is no uniformity in the strata and as a consequence a large percentage of the material is passed over the spillway and back into the borrowpits. This is an economic waste which time and experience and a change in specifications can correct.

Coarse sand yields the greatest output, is easy to dig and dries out quickly. Dense buckshot and clay require a heavy ladder and good cutter to dig, but they flow nicely through the pipe line and pile up on a slope of about one on seven. About 30 per cent of this material goes into solution while passing through the pipe and pump line and is wasted over the spillway. It should be used to seal borrowpits, for which it is ideal.

Soft blue clay pumps easily but it remains in a mucky state in the fill. It retains moisture for a long time and is troublesome owing to its tendency to slough.

Fine sand and loam pumps extremely well. It also flows freely in the fill. It makes a very good levee if the silt is not allowed to settle in pockets. If time is not important, there is an opportunity to build cheap levees with this material and there is an abundance of it to be found. When confined between dikes it holds water, and the best method of removing the water is to run a dragline on mats over the top surface. Capillary attraction draws the water to the top, from where it is drained off by small ditches.

General Operating Procedure

Before undertaking any hydraulic work it is extremely important to make a thorough investigation of all its phases. The borrowpits should be thoroughly explored and the amount and kind of material determined. This can be done effectively by using a 2-in. auger welded to a 3-ft. joint of ½-in. pipe. Lengths of pipe can be added as the hole goes down.

The next step is to read and analyze the specifications on the ground, unless one is thoroughly familiar with them. It is important to be sure that no unusual features will be encountered which might hamper the progress of the work.

One of the first things to decide is whether or not to put the levee up in one lift and to decide on the method to be used subsequently to top out. For levees less than 24 ft. high it is advisable to use only one lift, providing the material is buckshot clay or coarse sand. Dikes for this levee should be from 12 to 14 ft. high with side slopes of 1½ to 1 and have a 3-ft. crown. If the material is fine sand and loam and carries much silt, two lifts should be used, and the dikes should be 4 ft. wide on the crown and built with slopes as flat as 3 to 1, because seepage at the bottom frequently causes them to fail.

The best way to build up the fill is to carry the pipe line down each side close to the dikes and carry the last line down the center, putting on as much crown as possible to reduce rehandling of material with a dragline or hauling from borrowpits for topping.

The use of Y's in the pipe line is not worth while with small dredges. They cut down the velocity and reduce output, while time lost taking down and rebuilding new lines with small-diameter pipe is not a handicap of importance.

Dikes should be kept at least 1,000 ft. in advance of the dredge, and spillways provided for at abo 500-ft. intervals. Spillways should be built of 1x10-i lumber and be well calked to prevent leaking. Th should be put on a foundation and built up on the sid with sacks filled with earth and thoroughly tamp Spillways should be at least 3 ft. wide and it is highl important to keep them watertight. If they wash ou during pumping operations they are expensive to replac

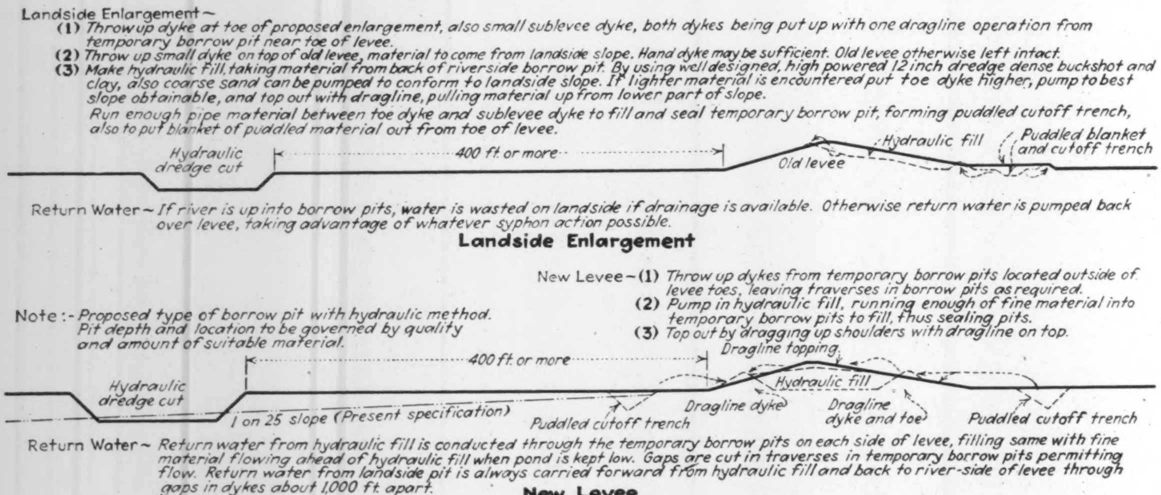
The time required for the levee to dry out and hard sufficiently for the further operation of putting up dike for a higher lift or topping with draglines or haulin equipment is a matter governed largely by weather conditions and character of material.

Economies can undoubtedly be effected by pumpin enough material between the dikes to complete the leve and within reach of a dragline, and permitting it t remain for a year. This would permit completion during the dry season and be the cheapest kind of operatio both for the dredge and the dragline. Present leve specifications are such that it is practically impossib to do this. The best procedure under the circumstance is to schedule work with a definite goal set for fina completion in the dry summer months. Finishing work in the winter months is troublesome at best, but it is doubly so with material which is already saturated a the beginning of bad weather.

Improved Construction Methods Proposed

If the method of building dams were followed in building levees, they could be so designed and located that the major portion of the yardage or the long-haul material could be pumped in cheaply by dredges, while the additional work of putting on top lifts, finishing, etc., could be done by the type of equipment now on the river, thus speeding up the program with a saving of both time and money.

Levee lines as laid out in the field at present are located to provide advantageous borrowpits for equipment now in use such as tower draglines and hauling equipment. The specifications are written in detail to conform to such methods of operation. To compensate for these inequalities it is obvious that the dredge must rely on its two principal assets—continuous running time and cheap transportation of material through the pipe line—in order to secure work at the prevailing competitive prices of levee construction.


Landside Enlargement ~
(1) Throw up dyke at toe of proposed enlargement, also small sublevee dyke, both dykes being put up with one dragline operation from temporary borrow pit near toe of levee.
(2) Throw up small dyke on top of old levee, material to come from landside slope. Hand dyke may be sufficient. Old levee otherwise left intact.
(3) Make hydraulic fill, taking material from back of riverside borrow pit. By using well designed, high powered 12 inch dredge dense buckshot and clay, also coarse sand can be pumped to conform to landside slope. If lighter material is encountered put toe dyke higher, pump to best slope obtainable, and top out with dragline, pulling material up from lower part of slope.
Run enough pipe material between toe dyke and sublevee dyke to fill and seal temporary borrow pit, forming puddled cutoff trench, also to put blanket of puddled material out from toe of levee.
Hydraulic dredge cut
400 ft. or more
Hydraulic fill
Puddled blanket and cutoff trench
Old levee
Return Water ~ If river is up into borrow pits, water is wasted on landside if drainage is available. Otherwise return water is pumped back over levee, taking advantage of whatever syphon action possible.
Landside Enlargement
New Levee ~ (1) Throw up dykes from temporary borrow pits located outside of levee toes, leaving traverses in borrow pits as required.
(2) Pump in hydraulic fill, running enough of fine material into temporary borrow pits to fill, thus sealing pits.
(3) Top out by dragging up shoulders with dragline on top.
Note :- Proposed type of borrow pit with hydraulic method. Pit depth and location to be governed by quality and amount of suitable material.
400 ft. or more
Dragline topping.
Hydraulic fill
Hydraulic dredge cut
1 on 25 slope (Present specification)
Puddled cutoff trench
Dragline dyke
Dragline dyke and toe
Puddled cutoff trench
Return Water ~ Return water from hydraulic fill is conducted through the temporary borrow pits on each side of levee, filling same with fine material flowing ahead of hydraulic fill when pond is kept low. Gaps are cut in traverses in temporary borrow pits permitting flow. Return water from landside pit is always carried forward from hydraulic fill and back to river-side of levee through gaps in dykes about 1,000 ft. apart.
New Levee

PROPOSED IMPROVED METHOD OF HYDRAULIC-FILL LEVEE CONSTRUCTION

In the final analysis there are only two difficult problems in any earth-handling project—the beginning or laying out of the work and the finishing. The laying out should anticipate the co-ordination of all items so that the finishing will be easy. In the meantime it is a daily routine of constantly carrying on the same motions. It is highly important in building levees so to schedule the work as to complete it during the summer months.

Dragline, tower and hauling-equipment operations have become so highly developed that costs are well known and there is little opportunity to develop more highly either the machines or their method of application. This condition does not exist with the dredge. There is much room for improved mechanical equipment, the personnel for levee work needs more seasoning, while the disposition of and method of handling the many different kinds of material offer a fertile field for betterment.

Failures of hydraulic contractors on the river to complete their work on time have not been due to the method, but were caused by inexperience, inadequate equipment or a combination of both.

It is very apparent that any contractor wishing to engage in this levee-building program should own and operate sufficient equipment to place at least 1,000,000 cu.yd. per year. The reason for this is the immense yardage in the levee sections—from 8,000 to 20,000 cu.yd. per station. Yardage of this magnitude is very suitable for large powerful earth-handling equipment, which means correspondingly low unit costs, and it behooves the contractor to think of this seriously, because with the low cost it will be impossible to do much subbing.

From a purely engineering standpoint, it does not seem probable that the best levee section has been designed, nor the best specification written for economy of construction or stability of structure. The strata in the valley are by no means uniform. Foundation conditions are very uncertain, and the building of the new and larger levees will develop an increasing amount of subsidence and sloughing. The suction dredge is the most efficient machine for building stable foundations. Seepage under the levees and through them, near the base, has been the main source of trouble in the past. As now built, the borrowpits have uniform slopes which must be rigidly adhered to. It is obvious that a foundation of clay or buckshot is entirely different than one of coarse sand, fine sand, silt or loam, and should be so treated. Developments along these lines will lead to an increased use of suction dredges to build up levee structures to elevations of from 10 to 15 ft. above the ground surface, using the best material within pumping distances of 1,000 to 2,000 ft. Where sloughs or bayous are crossed or other unstable foundation conditions exist, the unsuitable material should be removed and thrown back on the land side of the base, where it can be used to give weight at a point badly needed when high water pressure is against the levee. Dense material can be pumped in to replace it, thus stabilizing the foundation and sealing it to prevent seepage.

The method of levee enlargement can be greatly improved by putting the enlargement on the land side rather than on the river side. Dredges can pump the material from riverside pits over the levee and conform to landside slopes with very little rehandling of yardage. This will preserve the present riverside slopes, which are hardened and sodded to prevent wave wash. Riverside enlargement on the new sections brings the toe of the slopes into the old borrowpits, which are covered with silt and provide very insecure foundations.

In many instances entire levees are moved or set back in order to provide sufficient borrowpit material to build the new levees to grade and section. These levees can be enlarged with dredges with a saving of an immense yardage as well as leaving structures already settled in place.

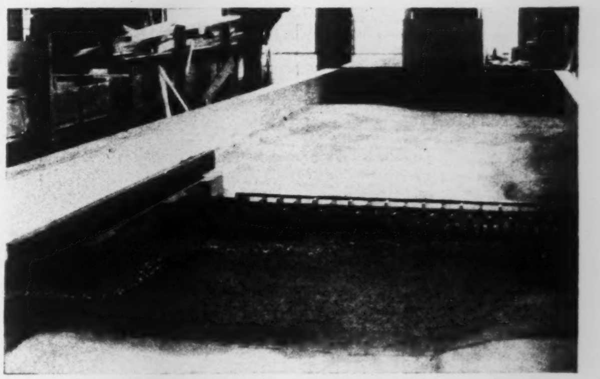
A revised specification for levee building, which would encourage and co-ordinate the use of all types of equipment which have proved economic, would tend to develop better and cheaper levees very promptly and hasten the entire project to a successful conclusion.

Tests on Models of Hastings Lock and Dam

By Wildurr Willing
Lieutenant Colonel, Corps of Engineers, District Engineer, St. Paul, Minn.

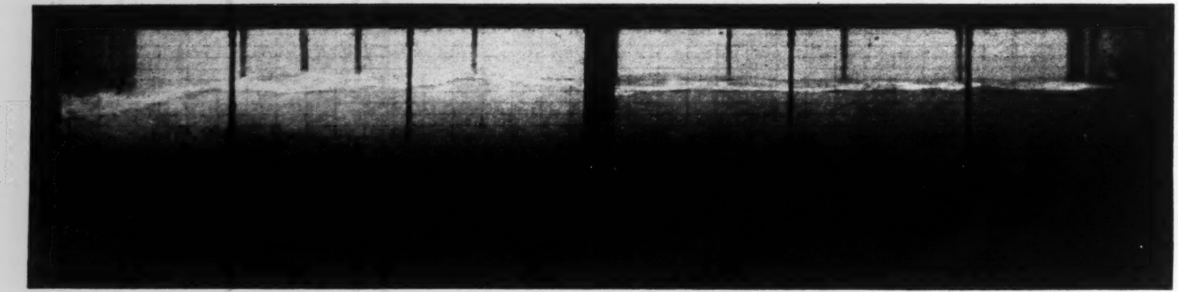
Under the direction of the district engineer, St. Paul, Minn., the United States is conducting experiments in the hydraulic laboratory of the University of Iowa on models of the Hastings lock and dam now in process of construction on the Mississippi River at Hastings, Minn., about 26 miles downstream from St. Paul. This project, authorized by act of Congress dated Jan. 21, 1927, will provide slackwater navigation with a minimum depth of 6 ft. between Hastings and the Twin City lock and dam at Minneapolis. The structure consists of about 1,000 ft. of movable dam—a lock 110x500 ft. inside, with a maximum lift of about 20 ft., a Boulé dam 100 ft. wide, and a section of twenty tainter gates, each 30 ft. long and 20 ft. high—and a fixed dam of earthfill type about 3,250 ft. long across the low area west of the river.

The foundation conditions existing at the site of the dam make the problem of scour prevention very adaptable to model studies. Except at the east end of the dam, suitable rock foundation does not exist at a reasonable depth below the streambed, and it was therefore necessary to build the entire structure on a foundation of wood and steel sheet-piling. Under such conditions the matter of toe protection becomes a problem peculiar



A VIEW OF THE GENERAL MODEL OF HASTINGS LOCK AND DAM BEFORE ACTUAL TESTING WAS BEGUN

Scale 1:100 horizontal, 1:50 vertical. Because of the distorted scale, the face of the tainter gates takes an elliptical shape instead of circular, and in order that the gates shall travel in their proper paths it was necessary to swing them about a center downstream from the location of the actual gate axis.



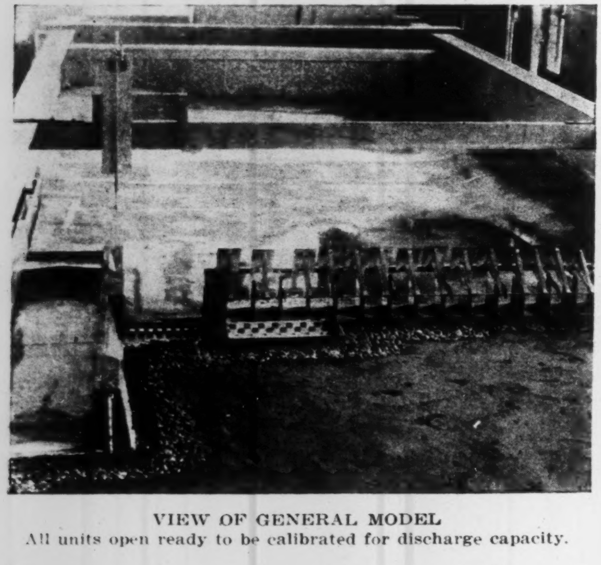
TEST ON STILLING BASIN
Discharge representing 15,000 sec.-ft. in full-size structure.

to the case in question and can perhaps be solved satisfactorily only by means of model experiments.

The movable portion of the structure has been duplicated in a model to a scale of 1 : 100 horizontal and 1 : 50 vertical in a steel testing flume 10 ft. wide and 42 ft. long. About 4,000 ft. of river channel has been reproduced to exact contours as determined by soundings in the river at the site of the dam. The model river channel is constructed of concrete except a section about 600 ft. long below the dam, which is shaped in sand for the purpose of studying erosion and the effectiveness of various devices for the prevention of scour at the toe of the dam.

VIEW OF GLASS FLUME SHOWING MODEL OF TAINTER GATE AND STILLING BASIN IN POSITION FOR TESTING

A model of one tainter gate has been constructed to a scale of 1 : 14 in a temporary wooden flume 2½ ft. wide, 39 ft. long and about 3 ft. deep. Below this gate, models of various types of stilling basins are being tested to determine correct shapes and dimensions required for the best protection against toe erosion. The flume is provided with glass walls over a length of 13 ft. which permit observation of water action on the streambed and progress of erosion, as well as current conditions in various parts of the structure.



VIEW OF GENERAL MODEL
All units open ready to be calibrated for discharge capacity.

Although the dam is being constructed to provide an immediate minimum depth of only 6 ft. in the pool, it is so designed as to fit into the ultimate project of 9-ft. navigation if and when it is carried through on the upper Mississippi River. The problem of maintaining a 9-ft. depth above Hastings involves some complications in the operation of the dam in order to avoid undue flowage damages, due to backwater, in the vicinity of St. Paul. The model tests point to a very satisfactory scheme of operation which will, it is thought, entail a minimum of flowage and a minimum of danger to the structure under any conditions of flow that are likely to occur in the river.

Hydraulic capacities of the various units in the structure are being determined, and currents affecting discharge through the dam and affecting navigation at the approaches to the lock and Boulé dam are also being studied in these model tests.

Results are recorded to a great extent photographically. Still photographs are taken of all interesting features and 16-mm. motion pictures are taken when it is desired to record the motion of the water and its action on the streambed.

Smoke Abatement Campaign Successful in Salt Lake City

For several years Salt Lake City, Utah, has been waging a smoke-abatement campaign in which the municipal authorities have had the co-operation of the U. S. Bureau of Mines and the University of Utah. The result has been to reduce the smoke from large industrial and heating plants 90 per cent. The campaign began in 1921 by the organization of a department of smoke inspection and abatement. An ordinance was drawn according to a plan recommended by the Bureau of Mines and a vigorous educational campaign was undertaken with all classes of fuel consumers. As a result of nine years' activity, although the smoke problem has not yet been definitely solved, it has been established that a large reduction can be made in the smoke from big industrial and heating plants and that even small heating plants can be successfully converted into smokeless types at small cost.

Tubes in Walls Permit Piledriving After Concrete Caisson Is Bottomed

Texas Highway Engineers Anchor Bridge Piers in the Tricky Brazos by Nailing Them Down With Steel Piles Driven Through Holes in the Caisson Walls

By Randle B. Alexander
Resident Engineer, State Highway Department, Brenham, Tex.

A CAISSON, which after being sunk permitted piles to be driven under the walls as well as in the dredging well spaces, was employed in building the highway bridge over the Brazos River near Chapel Hill, Tex. The caissons were built for the two piers for the 320-ft. channel span. These piers above the bases are of conventional dumb-bell section, built without batter on rectangular caissons of reinforced concrete, 44x17 ft. and 38 ft. high, as shown by Fig. 3. At 15 ft. above the cutting edge the size of the caissons was reduced to 42x15 ft.

The cutting edge and the roof for the working chamber were steel. They were erected (Fig. 2) on blocking placed on an island made by filling in a steel sheetpile cofferdam built around the site of the pier. After the cutting edge was erected and located accurately, the pile-guide tubes were spot-welded over holes left in the roof. These were 18-in. pipes with ¼-in. walls, received on the job in 18-ft. lengths; two pipes welded together made one tube. One end was beveled to fit the slope of the roof, and then the tube was lowered over the hole and oxyacetylene-welded to the roof. No attempt was made to secure a leakproof joint. Four or five 4-in. welds were sufficient to hold the pipe rigid. The hole in the roof was closed from the under side by a cast-iron plate, bolted to the roof with a gasket, since there was some likelihood of having to put air on the caisson.

With all guide tubes in position (Fig. 1) and the jetting system installed, forms were built and the concrete was poured. Caisson sinking and concrete pouring alternated, 48 hours being allowed to elapse after pouring before sinking was resumed. It was the plan to sink the caissons by dredging through the three wells and to assist and control the sinking by using a jetting system incorporated in the cutting edge. Because of errors in installation and a lack of sufficient pumps the jetting system was of no value on either caisson.

The first caisson was sunk by dredging until the first thin stratum of sandstone was encountered, where it stopped. A clamshell bucket would not dredge the material encountered and heavy loading produced no settlement. It had been about decided to put air on the caisson, when an attempt was made to pump it out. This proved successful and after the water was pumped out there was little difficulty in holding it down with two pumps of the condensation type. The material was then removed from under the cutting edges by laborers and thrown to the center of the well, where it could be picked up by the clamshell. Sinking progressed at the rate of about 2 ft. per day, working two shifts of ten hours each until the thicker sandstone strata were reached, where 6 in. per day was about the average drop.

On the second caisson but little dredging was done before men were put into the working chamber; it was felt that better control of the caisson during sinking could be maintained by this means. Level readings were taken twice daily during sinking and the foreman was handed a chart showing position and inclination. In this way, by giving proper regard to the tendency of the caisson to travel or lean, the foreman could work to counteract that tendency and hold it true to position.

The caissons were sunk through thin strata of sandstone which alternated with a more or less stiff yellow clay to a depth of about 38 ft. below the streambed, where they were landed on a hard sandstone stratum 18 to 24 in. thick. While it is felt that the material on which the caissons were landed would carry the loads, it was decided to carry out the original plan of driving piling to assist in carrying the load and to furnish additional stability to the pier, in order to satisfy certain interests and in light of experiences on the Brazos, where apparently hard and firm strata 10 to 12 ft. thick have shifted.

The piles were 100.5 H-column sections, 40 ft. long and were driven through the pile-guide tubes and in th

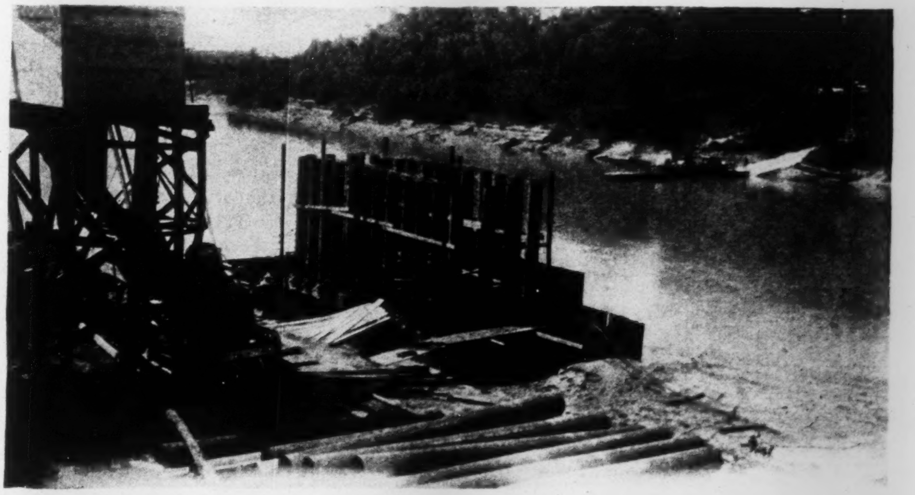


FIG. 1—CAISSON WITH PILE-GUIDE TUBES BEING CONCRETED INTO WALLS

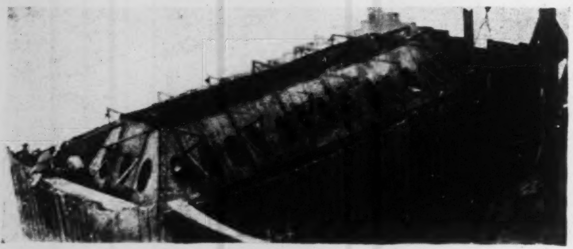


FIG. 2—STEEL CUTTING EDGE FOR BRAZOS RIVER BRIDGE CAISSON

dredging wells, as shown by Fig. 3, to a depth of 25 to 30 ft. below the cutting edge. Pilot holes were dug through the sandstone for the first 30 piles, but trial showed that very little shattering occurred when this was not done, therefore the remainder of the piles were driven without holes.

The piles driven in the guide tubes were allowed to drop 5 or 6 ft. onto the cast-iron plates which closed the bottom of the tubes. This shattered the plates. The piles were then driven by a follower made of an H-column section with a foot plate about 2 in. thick welded to its bottom. This foot plate was 16 in. in diameter, which made it fit loosely in the 18-in. guide tube (Fig. 3). The top of the follower fitted into a special driving cap attached to the hammer.

A single-acting 7,500-lb. steam hammer was used. It was suspended free from the derrick line at the first pier, but was guided by short swinging leads at the second pier. A total of 46 piles was driven in each caisson, 16 in the wells and 30 in the pile-guide tubes, all to a resistance well over the 50 tons specified.

On the completion of piledriving operations, a 15-ft. seal course of 1 : 2 : 4 concrete was poured. All seal concrete was placed in the dry with the exception of part of the center dredging well of each caisson which served as a pump. Provision was made for grouting all drains leading into the sump, after which it was concreted by means of a tremie.

The center dredging well was not filled to the top with concrete, but was closed by a precast concrete slab 1 ft. thick, on top of which 2 ft. of concrete was poured to make a 3-ft. thickness of cap. The outside wells wer filled to the top with the 1 : $2\frac{1}{2}$: 5 concrete. The pil guide tubes were filled to the top with 1 : 2 : 4 concre at the time the caisson was sealed.

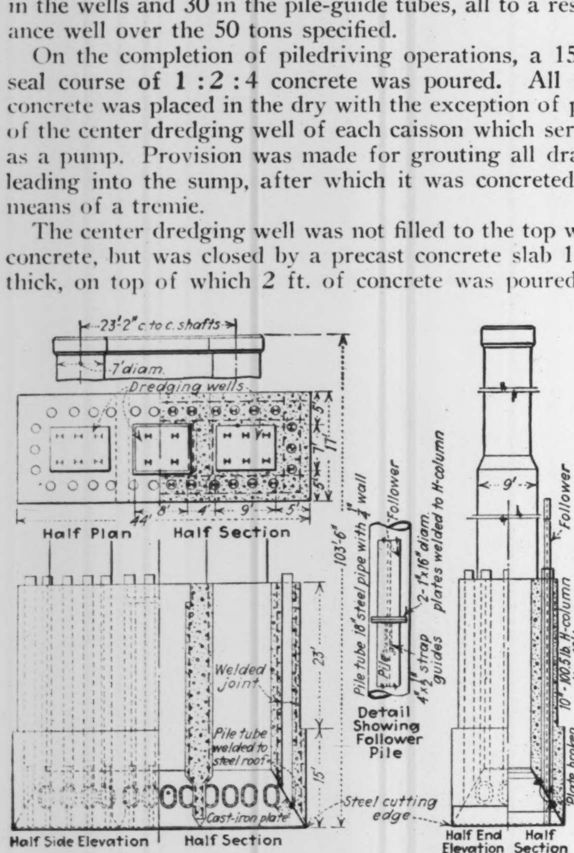

23'-2" c. to c. shafts
7' diam.
Dredging wells
5'
7'
17'
5'
44'
8'
4'
9'
5'
Half Plan
Half Section
103'-6"
23'
15'
Welded joint
Pile tube welded to steel roof
Cast-iron plate
Steel cutting edge
Half Side Elevation
Half Section
Pile tube 18" steel pipe with 1/4" wall
Follower
2-1"x16" diam. plates welded to H-column
Pile
4"x1/2" strap guides
Detail Showing Follower Pile
9'
Follower
10"-100.5 lb. H-column pile 40' long
Plate broken by dropping pile
Half End Elevation
Half Section

FIG. 3—CAISSON CONSTRUCTION FOR HIGHWAY BRIDGE OVER BRAZOS RIVER IN TEXAS

It is believed that this method of providing for driving piles near the outside of a caisson or pier foundatio after the caisson is landed is new. The idea was that o G. G. Wickline, bridge engineer, Texas State Highwa Department. The writer is resident engineer for th highway department and the Southwest L. E. Myer Co., Dallas, Tex., is the contractor.

Pavement-Curing Methods Compared on Parkway Drives

Calcium Chloride and Asphalt Emulsion Used in Tests Made by Park Commission of Westchester County, N. Y.

By W. Frederick Welsch
Division Engineer,
Westchester County Park Commission, Pleasantville, N. Y.

A COMPARISON of concrete-pavement curing procedure and results using an asphalt emulsion and calcium chloride applied integrally was made in building two sections of the Saw Mill River Parkway in Westchester County. The calcium chloride was used on 1.6 miles and the asphalt-surface treatment on $2\frac{1}{2}$ miles. The two operations were different contracts, both of which called for an 8-in. reinforced pavement 40 to 80 ft. wide. The concrete proportions averaged 1 : 2 : $3\frac{1}{2}$, but the aggregate volumes were varied according to the showings of the field tests in order to secure the greatest density and strength consistent with a good finish.

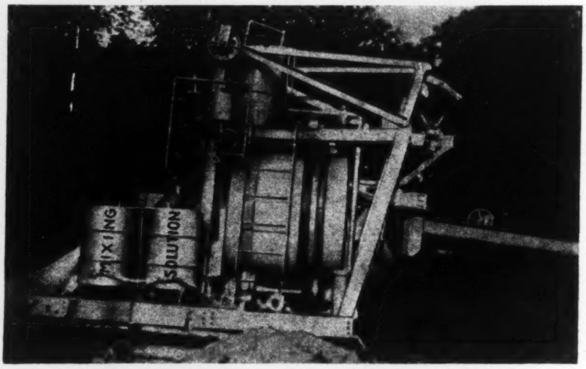

MIXING
SOLUTION

FIG. 1—MIXER FITTED WITH TANKS FOR CALCIUM CHLORIDE

Test cylinders 6x12 in. were made during the progress of the work and tested at the ages of 7 and 28 days. Upon the completion of the paving on both contracts, an average of two months after the concrete had been placed, concrete cores were secured by a boring machine, and the samples sent to the laboratory for testing, to ascertain the compressive strength of the actual concrete in place.

Curing Procedure With Calcium Chloride

The calcium chloride was a commercial flaked salt, delivered in metal, airtight drums, which was incorporated in the concrete mixture by means of two 50-gal.

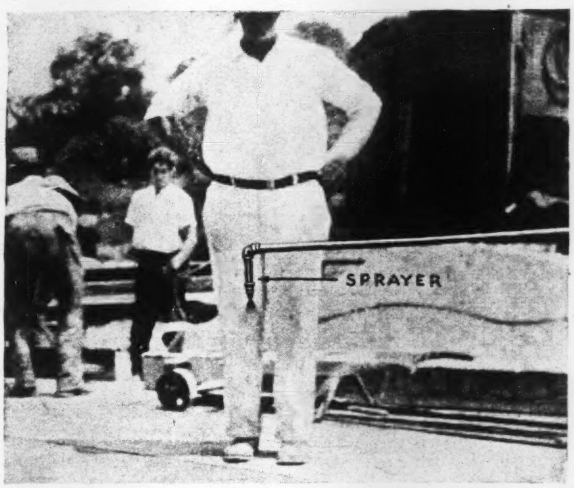


FIG. 2—APPLYING ASPHALT-EMULSION CURING COAT

tanks, which were mounted on the platform of the concrete mixer. One tank was used for mixing the solution, which was then transferred to the second tank, from which the necessary quantity was drawn into the drum of the mixer for each batch. The solution was made by filling one tank about three-quarters full of water, adding 200 lb. of flaked calcium chloride and stirring until the material was all dissolved. Enough water was then added to fill the barrel and was stirred until the solution was uniform. The 50 gal. of solution then contained 4 lb. of calcium chloride per gallon, or 1 lb. per quart. This solution was added to the mix in the proportion of 2 qt. for each bag of cement as a part of the mixing water, the amount of the mixing water being reduced by an amount equal to the added quantity of the solution. During warm weather the concrete after finishing was covered with wet burlap, which was kept wet for at least 48 hours, after which the burlap was removed. Fig. 1 shows the position of the mixing and solution tanks mounted on the platform of the concrete mixer

Curing Procedure With Asphalt Emulsion

On that section where the asphalt-emulsion, surface-treatment method was used, the emulsion was applied to the surface of the concrete as soon as possible after brooming, when it was sufficiently firm to resist the impact of the spray without being marked. The liquid was applied in a continuous, uniform film by means of a pressure sprayer at an average rate of 1 gal. per 10 sq.yd. of surface—sufficient pressure being used to deliver the emulsion in a fine spray or mist. Fig. 2 indicates the position of the spray pipe and the nozzle, and the spray is just visible above the surface of the concrete.

TABLE I—COMPARISON TESTS OF CONCRETE CYLINDERS MOLDED FROM CONCRETE AS PLACED

	Calcium Chloride			Asphalt Emulsion	
Date	7 Days	28 Days	Date	7 Days	28 Days
May 28, 1929	2,745	3,027	May 28, 1929	2,625	3,421
May 31, 1929	2,731	......	May 31, 1929	2,211	......
June 3, 1929	3,930	......	June 3, 1929	2,813	......
June 5, 1929	3,113	......	June 5, 1929	1,932	......
June 7, 1929	3,396	3,308	June 7, 1929	3,523	......
June 10, 1929	3,530	3,877	June 10, 1929	3,520	......
June 11, 1929	2,839	......	June 26, 1929	2,368	4,083
June 12, 1929	2,935	......			
June 18, 1929	2,848	......			
June 19, 1929	2,087	......			
	10)30,154	3)10,212		7)18,992	2)7,524
Average	3,015	3,404		2,713	3,762

TABLE II—COMPRESSION TESTS OF CONCRETE CORES TAKEN 2 MONTHS AFTER PAVEMENT WAS LAID

No.	Area in Sq.In.	Crushing Load, Lb.	Crushing Strength, Lb. per Sq.In.
		Calcium Chloride	
1	14.514	42,300	2,914
2	14.514	54,000	3,720
3	14.514	49,200	3,322
		Asphalt Emulsion	
4	14.514	76,600	5,278
5	14.514	50,400	3,472

Comparison of Test Cylinders

The results of the tests on cylinders and cores are given in Tables I and II. The theoretical compressive strength of this concrete at the age of 28 days was computed at 2,400 lb. per square inch. In view of the fact that the cores were taken when the age of the concrete averaged two months, the theoretical compressive strength would be higher than the 28-day concrete and probably should average 300 lb. per square inch more, or 2,700 lb. per square inch.

There are advantages in both methods. Calcium-chloride-cured concrete will allow the contractor to operate his equipment over completed slabs one week after they are poured. By the asphalt-emulsion-curing method, the surface of the concrete has a dark color which eliminates the objectionable glare caused by sunlight on the pavement and is an advantage to motorists.

Both methods are, in the writer's opinion, superior to the water-curing method, where straw or earth is applied and kept wet for two weeks or longer. The field engineer is assured that all concrete is properly cured, whereas in the old water-curing method he is not certain that the surface of the concrete is kept wet at all times. Where calcium chloride is used, the apparatus and materials are always in view during inspection, and in the asphalt-emulsion surface treatment the dark color indicates at a glance whether or not the entire surface is properly covered.

Directing Organization

Engineering and construction work is under the jurisdiction of the Westchester County Park Commission. Jay Downer is chief engineer in executive charge of all work and L. G. Holleran is deputy chief engineer in charge of engineering and construction. The work described is in the Western Division, the writer being division engineer in charge, and the late Christian Kopp, resident engineer.

Dimension Tolerances in Steelwork at Elevator Shafts

A study of required tolerances in the accuracy of erection of steelwork at elevator shafts in buildings has just been made by a committee of the Structural Steel Board of Trade, New York City (Aubrey Weymouth, of Post & McCord, chairman of the committee). The report finds that 1 in. is the normal permissible variation from the true plumb for elevator-shaft steelwork, and that steel contracting practice has regularly found it possible to meet such requirements. In high tower buildings, however, the committee believes that larger allowances should be made, and suggests that for buildings higher than twenty stories the 1-in. variation be increased by $\frac{1}{32}$ in. for each additional story, up to a maximum of 2 in. The tolerances recommended by the committee have been adopted by the board as a definition of standard practice in steel erection.

Steel Tower Provides Rigid Base for Drill at Golden Gate

Difficulties Due to Swift Tidal Current Overcome by Use of Special Drill Supports

IN MAKING the diamond core-drill test borings for the south pier of the proposed Golden Gate bridge connecting San Francisco with Marin County to the north, unusual methods were employed to secure a rigid base for the core drills. As noted in *Engineering News-Record,* April 10, p. 614, strong tidal currents of 7 to 8 miles per hour were encountered. A change of 7 ft. in water elevation between high and low tide, rough seas in the bay and an irregular ledge scoured free from silt were additional difficult factors.

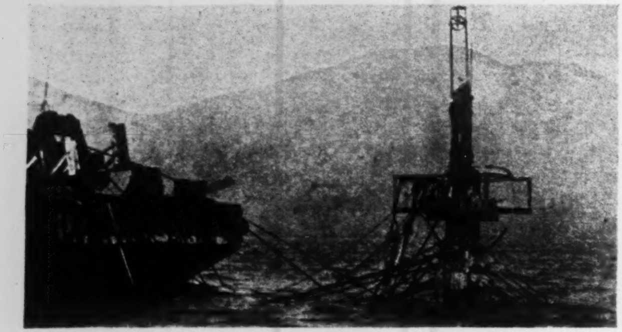


FIG. 1—DIAMOND CORE-DRILLING OUTFIT ON TOP OF STEEL TOWER

The south approach is planned to take off from the high land on the Presidio back of Fort Point, with the north terminus on a hill at Lime Point, the water distance across the bay being approximately 6,000 ft. On the south side, the anchorage location is on land and the pier site is 1,100 ft. from shore in 60 ft. of water. The proposed site of the north pier is roughly 100 ft. from Lime Point in about 25 ft. of water.

For the drilling a steel cage or tower 2 ft. square was built in five sections, three 20-ft., one 10-ft. and one 5-ft. The corner uprights were of 6-in. angle iron with sides of 3-in. lattice bracing. These sections were bolted together and at the insections added strength was secured by means of ⅜-in. plates, 2 ft. square. The cage was surmounted by an 8x10-ft. platform of steel girders, with 3-in. planks for the drill set-up. Vertically through the center of the cage was set a 6-in. extra heavy pipe, into which was dropped a 4¼-in. heavy casing. For some holes a 3-in. pipe was used inside the 4¼-in. pipe. Through the pipe of smallest dimension the drill rods were lowered to the rock. The entire cage, with 2,500 lb. of ballast at the bottom, weighed about 5 tons.

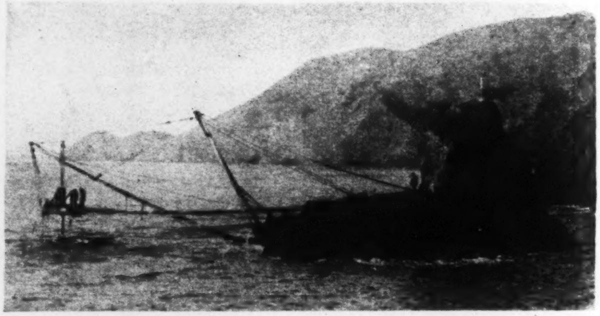


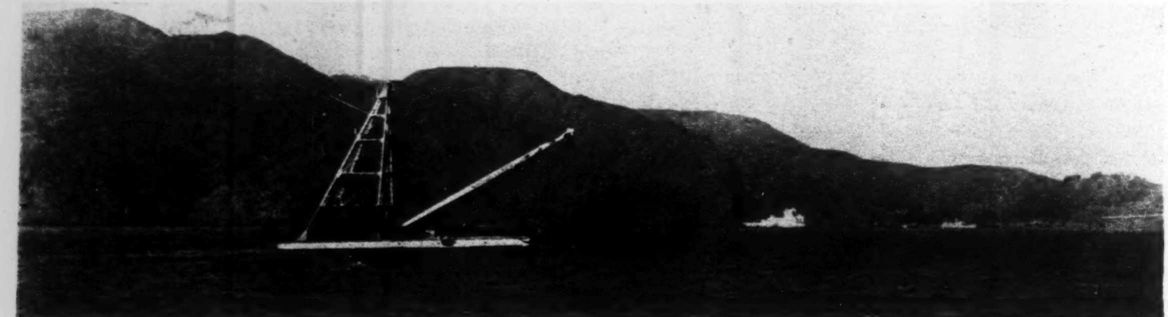
FIG. 2—BOOM ON ISLAND SUPPORTING PLATFORM FOR DRILLING OUTFIT

Six test borings were made on the south pier site, penetrating rock from 40 to 100 ft., recovering core samples 2 in. in diameter. Three land holes were drilled on the south anchorage site to depths of 105, 137 and 140 ft. The north anchorage site on Lime Point had three borings from 61 to 100 ft., and on the north pier site three holes penetrated rock at from 30 to 73 ft. depth.

A heavy derrick barge was used in moving the cage to the drilling locations, at which points it was moored with four 9-ton and two 6-ton anchors. The cage was then lowered from the boom to the ocean bed. Until securely set, an approximate vertical position was maintained against current pressure by means of the weighted bottom. When in position the cage was held rigidly by six steel mooring cables with 1½-ton anchors. The diamond core drill was then hoisted by means of the derrick to the cage platform. Steam was furnished from a boiler set up on the barge, which was anchored 25 ft. away until the particular hole was completed. When moving to a new location the cage was hoisted onto the barge. On occasion the pitching motion of the barge in stormy weather delayed setting the cage for a new drill hole.

Conditions at the north pier site were less difficult, as the water was not so deep. Since the drill locations were only 50 to 70 ft. from a small rocky island off Lime Point, the drill set-ups were accomplished by means of a platform construction supported by a boom.

The contract was carried out for the Golden Gate Bridge and Highway District by the E. J. Longyear Exploration Co., of Minneapolis, Minn.



DERRICK BARGE SETTING UP THE DRILLING TOWER

Reliability of Cold-Drawn Bridge Wire Assured by Recent Test

New Wire for Detroit and Mount Hope Bridges Subjected to Most Comprehensive Investigation Yet Made—Fatigue Tests Novel Part of Study

By Leon S. Moisseiff
Consulting Engineer, New York City

THE PROGRAM of tests carried out at Lehigh University on the cold-drawn bridge wire which replaced the failed heat-treated wire for the Ambassador bridge at Detroit and the Mount Hope bridge at Providence, R. I., was planned to cover all practical questions in connection with the strength and behavior of bridge wire during its storing, erection and subsequent service as a part of the cables. The same wire, No. 6 gage galvanized, is used in both bridges—3,000 tons at Detroit and 700 tons at Mount Hope. In addition to the more usual tests—modulus of elasticity, shape of stress-strain curve, proportional limits, ultimate strength, elongation and reduction and uniformity along a coil—creep or fatigue tests under loads up to 1½ times the design stress for periods up to two months were made. Freezing tests, determination of effect of mishandling and of wedging action completed the program and made the tests the most systematic and comprehensive yet undertaken on bridge wire. The results were satisfactory and reassuring. The tests were organized by the contractor for the two bridges, the McClintic-Marshall Co., and the program was laid out by Jonathan Jones, chief engineer of the company, in consultation with Professors W. H. Slater and Bradley Stoughton and the author. The wire was furnished by the American Cable Co.

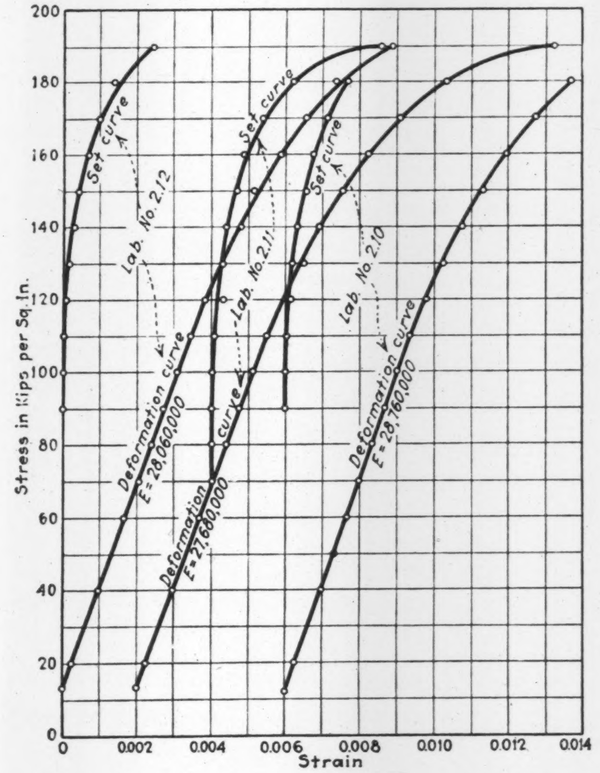


FIG. 1—TYPICAL STRESS-STRAIN AND SET CURVES

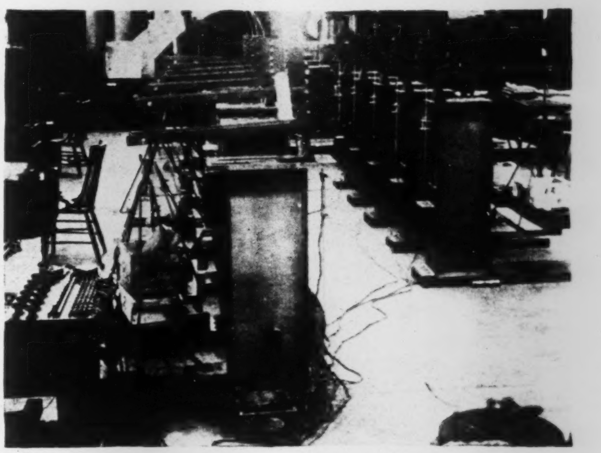


FIG. 2—SPECIAL WIRE-TESTING MACHINES
Note electric telemeter panel in left foreground

Briefly, the specifications for the wire required that it be of acid open-hearth type containing not more than 0.85 carbon, 0.04 sulfur and 0.04 phosphorus. Physical property requirements were: 215,000 lb. per square inch tensile stress, 144,000 lb. per square inch yield point, measured at an elongation of 0.75 per cent in an original length of 10 in., and a 4 per cent minimum elongation in 10 in. while under tension.

Of the approximately 300 tests made, only four specimens, 0.13 per cent, showed ultimate strength less than 215,000 lb. per square inch, the lowest being 212,000 lb. A total of 45 yield-point determinations met the specification requirements.

Tension Tests—Two series of tension tests were run, the special purpose of series 2 being to determine the stress at which permanent elongation began. In this test the wire was subjected to stresses progressively increasing to about 80,000 lb. per square inch, after which the load was decreased to the initial load of about 13,000 lb. and a reading taken. This procedure was repeated until load-stress and load-strain curves were obtained. Specimens in both series were from the same coil of wire. Typical stress-strain and set curves are shown in Fig. 1. The proportional limit, the stress at which the stress-strain curve departed noticeably from a straight line, was 103,300 lb. for series 1 and 102,900 lb. per square inch at first set for series 2, a difference of only 0.9 per cent of the average. The agreement of the two series in this and other respects is an indication that the stress at first set may be taken as a close measure of the proportional limit.

Creep Tests—Creep or fatigue in tensile stress—that is, increase in strain under a constant load—was studied at loads up to 50 per cent greater than the bridge design stress.

Three series of long-time tests were made—with wire suspended straight and with wire bent over a sheave both in its natural coiling curve and opposed to its natural coiling curve. These series were designated as 3, 4 and 5. They were as follows:

Series 3A—Wire suspended straight from clamps and loaded by dead weight. Initial load 76,000 lb. per square inch increased daily by 19,000 lb. per square inch until approximately 114,000

Abstract of paper presented at convention of American Society for Testing Materials, Atlantic City, June 23-27, 1930.

lb. was reached. This load was left for two weeks, observations for creep being measured with an electric telemeter, after which the specimen was tested to failure.

Series 3B—Wire similarly suspended and loaded straightway to failure for comparative results.

Series 3C—Wire tested in same manner as under 3A except that the load of approximately 114,000 lb. per square inch was retained for two months.

Series 4—Similar to series 3 except that the wires were suspended over a 19½-in.-diameter sheave, clamped at one end and loaded at the other. Wires placed over sheave without preshaping and bent in the direction of their natural coiling curve.

Series 5—Identical with series 4 except that wires as placed on the sheaves were bent in the reverse direction of their natural coiling curve.

For these long-time tension tests, twelve special machines shown in Fig. 2 were built. The sheave had a longitudinal groove rectangular in cross-section and wide enough to seat two wires side by side. The wires had their bearing on the sheave throughout an angle of 180 deg.

Results of Creep Tests—Fig. 3 shows several typical rate-of-creep curves. The averages for the two-week tests indicated that the largest creep occurred with the specimens which were bent around the sheave in the reverse direction of the coiling curve, the next largest with those tested straight, and the least with those tested in the direction of the coiling curve. The averages for the two-month tests indicated, on the other hand, that the largest creep occurred with those tested straight, the next largest with those bent in the direction of the natural coiling curve, and the least with those bent in the reverse direction. When the values for the two-weeks and the two-months tests were averaged, those tested straight showed somewhat the larger creep, and there was no great difference between those bent in the natural direction of the coiling curve and those bent in the reverse direction. The average creep was 280, 215 and 224 millionths for the specimens tested straight, bent in the natural direction and reverse direction. With this difference in the results for the two-weeks and the two-months tests, it seems fair to conclude that there was little difference so far as creep is concerned between the straight specimens and those bent in either direction.

It was also concluded that the tensile strength was not affected by the duration of test or by testing the wires around the sheaves.

Effect of Mishandling—A number of wires were subjected to all possible kinds of mishandling, such as (1) being dented; (2) closed up on a 5-in. radius, straightened, closed in the opposite direction, and straightened again; (3) preshaped by pulling vigorously around a 4-ft. diameter sheave and released; (4) kinked at an angle of ½ in. in 12 in., straightened and subjected to other operations that might occur during erection or service. Finally the wires were placed over a 19½-in.-diameter sheave in a testing machine and tested directly to failure.

The greatest reduction in strength, 3.6 per cent, was on a wire dented on the straight portion. In all other cases the reduction in strength was less than 1.5 per cent. It may be concluded that the mishandling had no effect on the strength of the wire.

Low-Temperature Tests—Wires subjected to contact with dry ice during the process of testing (temperatures from —67 deg. to —103 deg. F.) broke outside of the box of dry ice and although tensile strength was reduced by 0.56 per cent, this must be considered accidental.

Tests made to study the seating and wedging action

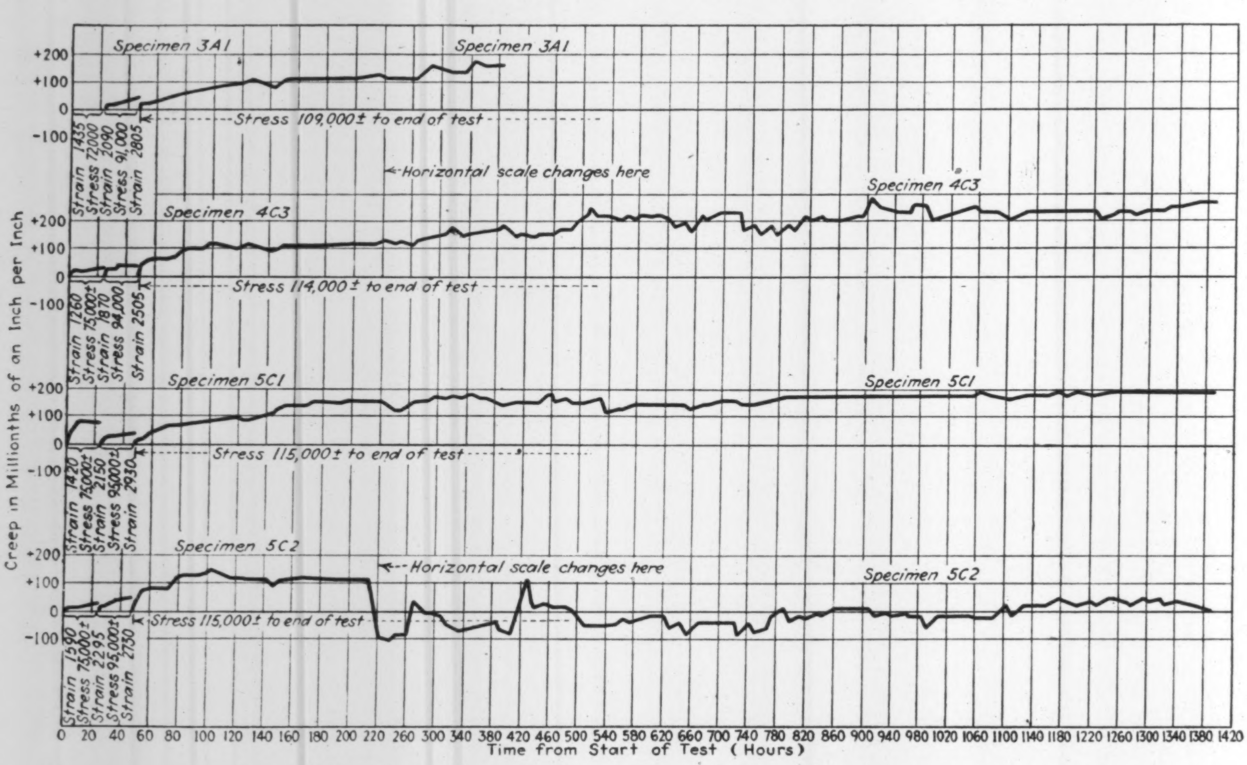


FIG. 3—TYPICAL RATE OF CREEP CURVES FOR COLD-DRAWN BRIDGE WIRE

Series 3A: Wire tested straight, load held for two weeks. Series 4C: Wire tested around 19½-in. sheave, bent in natural coiling direction, load maintained two months. Series 5C: Wire tested around 19½-in. sheave, bent in reverse direction to coiling, load maintained two months. Curve 5C2 was one of most irregular obtained.

of wires laid over strand shoes showed that the effect of variation in seating conditions on strength of wire is negligible.

To investigate the effect of the bending stresses developed by coiling the wire to a diameter of 19½ in. during a prolonged time, ten wires 300 to 400 ft. have been so coiled and stored for nearly a year with no breakage or other visual defects noted.

Deep etching and metallographic tests showed the wire to be of average commercial structure and uniform hardness, and while not entirely free from inclusions of slag, it was fully sufficient to meet the exactions imposed upon it by the tests.

Conclusions—The results of the tests are highly satisfactory in all respects: (1) The wire along a coil was found to be as uniform as practical testing can indicate. (2) The limit of proportionality and the commencement of noticeable permanent set were found to be well above the design stresses of modern suspension bridges. (3) The continued load test developed no noticeable effect on the tensile strength of the specimen. (4) No wire broke in the covered portion on the sheave or at the point of tangency. (5) The phenomenon of creep shows satisfactory and interesting results, the average creep under 114,000 lb. per square inch during two weeks being 230 millionths and within two months about 240 millionths.

New Series of Tests Compares Beam and Control-Cylinder Stresses

Maximum Compressive Stresses Agree With Straight-Line Formula Results—Beam Stresses at Failure Considerably Larger Than Ultimate Strength of Control Cylinders

By Willis A. Slater and Inge Lyse

Director, Fritz Engineering Laboratory, Lehigh University; and Assistant Engineer, Portland Cement Association

In order to add to the rather meager data available on the relation of the compressive strength of concrete beams in flexure to that of 6x12-in. control cylinders tested in compression, the Fritz Engineering Laboratory at Lehigh University has recently carried out two series of tests, in one of which, with beams of equal dimensions, the cylinder strength of the concrete ranged from about 1,400 to 5,800 lb. per square inch, and another series in which, for two different strengths of concrete (2,800 and 4,000 lb. per square inch), the depth to the center of gravity of the reinforcement varied from 4 to 14 in.

Test beams designed with usual working stresses—16,000 lb. per square inch for the steel and 32.5 per cent of the compressive strength of control cylinders for the concrete, in accordance with the old joint committee recommendation (raised by a later committee to 40 per cent)—have always failed in the reinforcing, at a load generally 2½ to 3 times the working load. Some tests, however, have been made on beams with sufficient reinforcement to develop compression failure of the concrete and have shown ratios of maximum to working load considerably larger. The results of some of these tests are shown in Fig. 1. For both the German and United States tests the strength of the concrete computed by the straight-line formula was considerably greater than the strength of the concrete as shown by tests of the control cubes or cylinders. These tests indicate that the "beam-cylinder strength ratio," as defined in the caption of Fig. 1, increased as the strength of the concrete decreased, although this variation is less marked in the Bach and Graf tests than in the others.

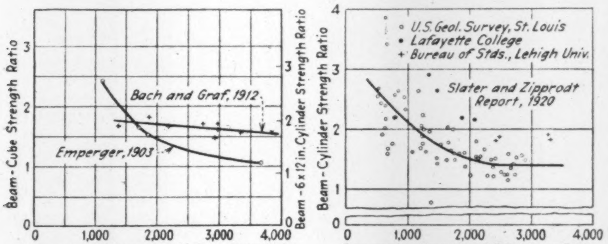


FIG. 1—RESULTS OF PREVIOUS TESTS OF HEAVILY REINFORCED CONCRETE BEAMS

Ratio given is computed compressive stress in the beam at maximum load to the ultimate compressive strength of the concrete as determined by testing the cubes or cylinders. The beam-cube ratios are translated to beam-cylinder ratios in the German tests so as to be comparable to the United States test.

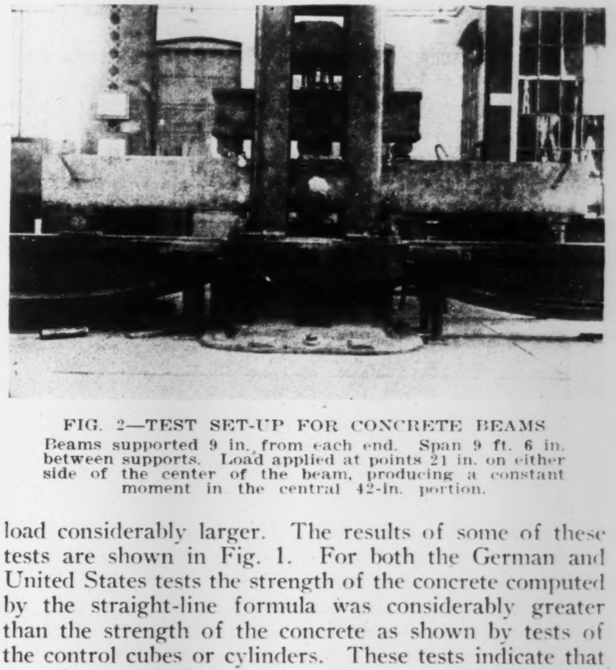


FIG. 2—TEST SET-UP FOR CONCRETE BEAMS

Beams supported 9 in. from each end. Span 9 ft. 6 in. between supports. Load applied at points 21 in. on either side of the center of the beam, producing a constant moment in the central 42-in. portion.

In the recent Lehigh University tests a total of 36 beams was made. All beams were 8 in. wide and 11 ft. long, but of varying depths, as indicated above. The percentage of reinforcement varied from 2.1 to 5.6, insuring against tension failure in the steel. Web reinforcement was used to guard against diagonal tension failure. Web and longitudinal steel were welded into a rigid unit prior to placing in the forms. Three beams of each kind were made for each group. The control specimens consisted of 6x12-in. cylinders and three were made with each beam. The concrete-aggregate combination consisted of 40 per cent sand and 60 per cent gravel.

Beams and cylinders, after 48 hours in the forms, were cured in a moist room of 100 per cent humidity and a temperature of approximately 70 deg. F., until tested at an age of 28 days. The beam test set-up is shown in Fig. 2, and was of such nature as to produce a constant moment in the center 42 in. of the beam.

Longitudinal deformation measurements were taken on the concrete near the top of the beam and at the elevation of the center of gravity of the reinforcement, and in some cases near the neutral axis of the beam. The center deflection was measured on all the beams.

Discussion of Results—All beams except two failed in compression of the concrete between the loading points. Generally the failure was very close to the center. Beams of low-strength concrete gave a gradual failure, while beams of higher strength concrete broke suddenly without previous warning. Two beams failed in diagonal tension at a load nearly equal to that of the companion specimens failing in compression. The uniformity in strength results obtained from the tests of three beams in each group was found to be very good. The greatest of the maximum variations for any group was 13 per cent, and the average of the maximum variations for all groups was 8.2 per cent.

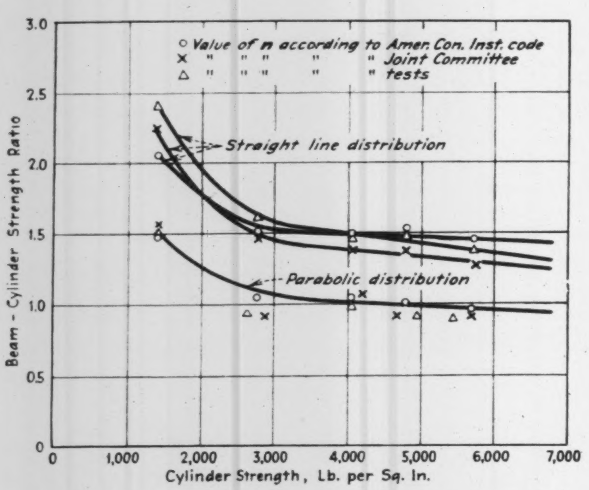


FIG. 3—RELATION OF BEAM-CYLINDER STRENGTH RATIO TO STRENGTH OF CONCRETE

Variations in the assumed values of *n* seem to have small effect on the beam-cylinder strength ratio either for straight-line or parabolic distribution.

A fair degree of uniformity of the concrete as measured by the strength of the control cylinders was also secured throughout the series. The maximum variation from the average in any group of beams was 12.9 per cent and the average of the maximum variations for all groups was 6.4 per cent.

In Fig. 3, the beam-cylinder strength ratios have been plotted against the strengths of the control cylinders. The upper curves represent the values of the beam-cylinder strength ratio when the ordinary straight-line formula is used for computing the stresses. It will be noted that the ratios are considerably above 1 for all the groups included. For the lower curve, resulting from use of a parabolic formula, the beam-cylinder strength ratios are above 1 for all concrete with strengths up to 4,800 lb. per square inch.

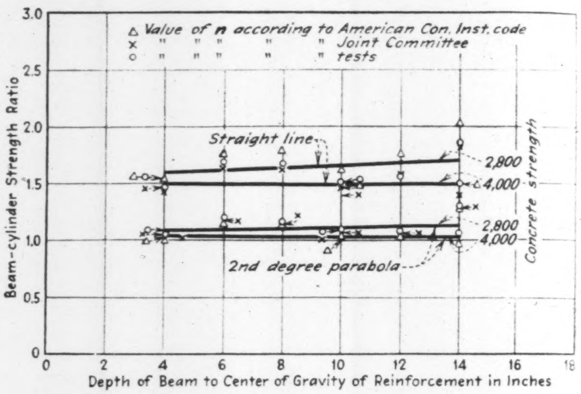


FIG. 4—RELATION OF BEAM-CYLINDER STRENGTH RATIO TO DEPTH OF BEAM

The beam-cylinder strength ratios for beams with different depths and two different strengths of concrete (2,800 and 4,000 lb. per square inch), plotted in Fig. 4, seem to justify the conclusion that the effect of the variation in the depth of the beams on the beam-cylinder strength ratio was negligible.

Fig. 5 shows the relation between the observed compressive stresses in the beams and the stresses computed by means of the straight-line formula. The so-called observed compressive stress is that stress which in the cylinder caused the same strain (taken from the stress-strain curve) as occurred in the beam under the corresponding computed stress. The values of *n* used in these computations accorded with those in the specification for the American Concrete Institute's building code. The dotted line in Fig. 5 gives the condition for equal computed and observed stresses. It will be noted that for stresses up to the strength of the cylinders there is a close agreement between the observed and the computed stresses. The indication is that in a beam at maximum load the computed compressive stresses are in agreement with the stresses for corresponding strains in the cylinders (the straight-line formula) up to a height above the neutral axis at which the stress is approximately equal to the cylinder strength. For points above this height the stresses in the beam are not known, but computations indicated that they must be somewhat greater than the cylinder strength in order to produce equilibrium between the internal and external moments. The foregoing is one of the important indications of the tests.

The average deflection for the different groups of

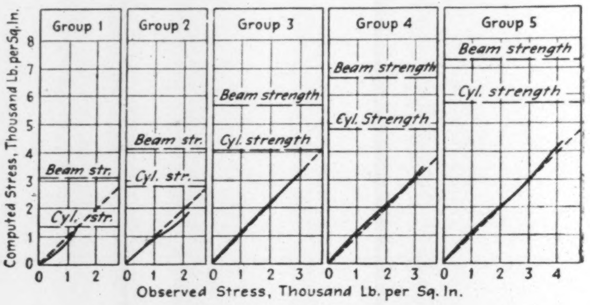


FIG. 5—RELATION BETWEEN OBSERVED AND COMPUTED STRESSES IN CONCRETE

Computations according to American Concrete Institute specifications. Note that beam strengths are in every case considerably higher than corresponding cylinder strengths.

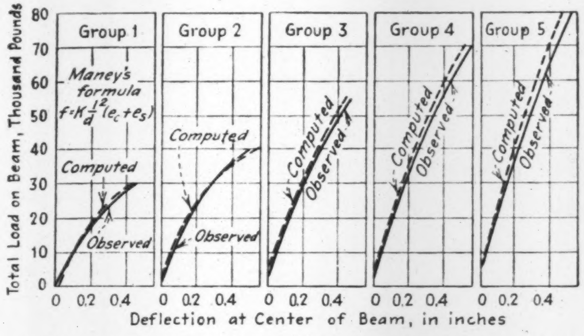


FIG. 6—RELATION BETWEEN OBSERVED AND COMPUTED DEFLECTIONS OF CONCRETE BEAMS

beams of five different strengths of concrete in which the size of the beams remained constant is shown in Fig. 6. For comparison, deflections computed from a formula proposed by Prof. G. A. Maney have also been shown. The agreement between the computed and the observed deflections is very good and indicates that an intimate relation exists between the measured deformations of a reinforced-concrete beam and the deflections. It will also be noted that the total observed deflections near the maximum load were practically equal for all the beams included in this series. In order for this to be true the deformations in the concrete must also have been nearly the same at maximum load for all groups. This was found to be approximately the case.

The test results also indicated that for design computations of stresses in the reinforcement of concrete beams the value of *j* might well be taken as a constant regardless of the values of *p* and *n*. A full report of the investigation is published in the *Journal* of the American Concrete Institute for June, 1930.

The Editor Goes Afield—
Observations at Detroit

International Transportation Facilities Ample for Present Traffic—Water-Tunnel Construction of Interest

DETROIT will soon have another direct route into Canada, for the vehicular tunnel under construction from the heart of the city to Windsor will be completed early this coming winter. The small amount of traffic crossing the new Ambassador bridge is surprising. Except on Sunday there are rarely more than four or five cars on the structure at a time. Opening of a new direct route for vehicular traffic into Canada from downtown Detroit will undoubtedly affect travel across the bridge adversely.

Incidentally, that new vehicular tunnel is a man-size job. The shield used in driving the approaches is 32 ft. in diameter, 2 ft. larger than the two used on the Holland tunnels in New York. Use of steel liner plates instead of cast-iron segments is another item of interest.

Detroit has another shield-driven tunnel under construction that is worth mentioning. S. A. Healy is advancing two headings of a 21-ft. water tunnel for Ford, a total of 70 ft. per day. He is using precast concrete blocks for lining. One heading gang recently made a 2½-ft. shove, mucked out, laid a ring of concrete blocks and moved the muck-car tracks ahead ready for another shove in exactly one hour and thirteen minutes. No lost motion there.

Pedestrians are given no consideration whatsoever in Detroit; the motorist reigns supreme. Apparently a change of traffic lights is a permit to mow down all the hapless pedestrians caught in the middle of the wide streets. The practice of allowing right turns on red lights is another hardship for the pedestrian. Crossing a Detroit street safely on foot is an accomplishment indeed.

The Grand Trunk Railway is doing a heavy piece of work between Detroit and Pontiac in building an elevated road on a new right-of-way for fast suburban service. There is talk of building an elevated highway over the railroad tracks, but such a scheme sounds dubious, as there seems to be plenty of space left in open country for highways without the necessity of putting them on stilts over railroad tracks.

Detroit is one of the few cities in the country with a municipally owned street-car system. Sometimes municipal ownership is believed to connote poor management, but after seeing canvas canopies on the principal street corners for the protection of waiting passengers, it is apparent that someone in the management has the interests of the car riders at heart.

Many of Detroit's magnificent new office buildings are but partly filled. Rumor has it that this situation is delaying the execution of several proposed building projects.

Grade-Crossing Accidents Per Vehicle Constant

Although the number of grade-crossing casualties in California for the past decade has increased steadily and reached a high mark of 1,154 killed and injured in 1929, the ratio of casualties per registered vehicle has remained practically constant during the same period, according to records recently released by the state railroad commission. Statistics beginning in 1913 show a marked decline from 460 casualties in that year (37.6 per 10,000 vehicles) to 221 casualties (5.7 per 10,000 vehicles) in 1918, during which period the registration tripled. Since 1918 the vehicle registration and total number of casualties have risen steadily each year, there being one exception in the latter case, but the ratio between the two has remaind almost constant, averaging 5.3 per 10,000 for the twelve-year period. The annual figures for the state since 1913 follow:

Year	Casualties Killed	Casualties Injured	Casualties Total	Motor Vehicle Registration	Casualties per 10,000 Vehicles
1913	83	377	460	122,444	37.6
1914	93	378	471	148,225	31.7
1915	73	338	411	190,196	21.6
1916	103	337	440	263,434	16.7
1917	117	231	348	337,333	10.3
1918	69	152	221	390,773	5.7
1919	78	199	277	503,522	5.5
1920	104	260	364	595,187	6.1
1921	96	297	393	698,343	5.6
1922	128	392	520	878,108	5.9
1923	134	392	526	1,114,977	4.7
1924	129	454	583	1,331,719	4.4
1925	169	560	729	1,451,543	5.0
1926	139	629	768	1,610,770	4.8
1927	194	763	957	1,702,639	5.6
1928	165	732	897	1,822,262	4.9
1929	200	954	1,154	1,983,969	5.8

Cleveland Regional Problems Discussed by Civil Engineers

Large Attendance at Summer Convention—City and Regional Developments in Cuyahoga County—First Description of Union Terminal—Party Visits Great Dirigible Shed at Akron

Coming 51 years after the society's first meeting in Cleveland, the 1930 convention coincided with completion of the new railway terminal on the Public Square, which represents the most extensive development in the city during recent years. Three papers on the terminal were read. Discussions before the technical divisions indicated that work in developing manuals is progressing actively. The professional status of the engineer took central place in the general session.

CLEVELAND'S hospitality and skill in arrangement drew an unusually large attendance from all parts of the country to the summer convention of the American Society of Civil Engineers last week. With a registration of some 600, the convention was among the strongest quarterly meetings in the society's recent history. However, only two half-day periods were devoted to technical proceedings, one of them comprising four simultaneous sessions of technical divisions.

Local developments dominated the program. The first description of the nearly completed Cleveland Union Passenger Terminal was presented, and this work, as well as the associated Shaker Heights residential development, was visited. Regional park planning in Cuyahoga County was outlined. The new dirigible shed of the Goodyear-Zeppelin Co. at Akron was covered in a detailed paper. A special trip was made to see this huge structure and the first stages in constructing a navy dirigible within it.

Other technical papers dealt with the coal-shipping installations of the New York Central R.R. at Toledo (B. R. Leffler, before the Waterways Division); sewage-works operation and control (a committee report to the Sanitary Division); trickling-filter materials (W. E. Stanley, H. F. Kriege, F. W. Jones and C. C. Hommon, before the Sanitary Division); and manuals on city planning and on land subdivision (H. E. Young and R. S. Wallis, before the City Planning Division).

Interest in Cleveland's growth was stimulated also by the opening address of the convention, in which George B. Sowers, the city's deputy commissioner of engineeing, referred back to the physical condition of Cleveland in 1879, when the society first met. He said in part:

> In 1879 we were a city of 150,000 people, the center of the iron-ore, oil-refining and ship-building business of the Great Lakes. The outstanding engineering work of that year was the Superior St. viaduct, which had just been opened to traffic. That bridge cost the magnificent sum of $170,000. The pride of 1879 was our Union Depot, still on the lake front; probably electric locomotives whisked you into its magnificent and beautiful successor, Cleveland's Union Terminal of 1930. The first portion of the breakwater was being built to form our lake front harbor. Today the breakwater stretches for more than 5 miles in front of the city, affording an excellent but not fully used harbor.
>
> In 1879 Cleveland's harbor, the river, looked like a New England fishing port. It was a sea of masts and sails. The ore was hoisted from the hold of the vessel in buckets and wheeled to the stock piles by burly laborers.
>
> Rapid transit in 1879 meant horse cars. Five years after that early convention the first electric street car appeared. A few months after the convention electric street lights were installed on the public square.
>
> We had an inspection trip that year to the factory of the late Mr. Brush to see his electric lamp and a dynamo. We went through the plants of the Otis Steel & Iron Works, the Cleveland Bridge & Car Works, the King Iron Bridge Co., the Novelty Iron Works, the Cleveland Rolling Mills Co. and the Standard Oil Works. It would take a week to go through those same plants, or their successors, today. There was an afternoon excursion to the Berea and Amherst sandstone quarries, which are still being operated on a large scale.

The Engineer's Professional Status

Two noteworthy discussions of the engineer's professional status characterized the opening session. President John F. Coleman took this subject as the theme of his presidential address, developing the thought that the engineer is at fault in being too inarticulate. Prof. William E. Wickenden, president of Case School of Applied Science, dealt with the same subject in a scholarly survey of past and present engineering, from which he led up to a radically new proposal for society certification. President Coleman said in part:

> For years there was a constant cry to the effect that the engineer did not receive the recognition which he deserved. Even now there is some excuse for it. It seems probable, however, that the engineer himself is in great degree responsible for such a state of affairs, in that he has been until recent times almost inarticulate in the councils of men; and at this date, while by no means silent, is heard far less frequently than he should be. It is astonishing how few laymen know what an engineer is and how he accomplishes the tasks allotted to him. For that situation the engineer is more to blame than the layman.
>
> Leaders of the profession have preached for years on the desirability of its members taking part in civic and other public affairs, and as time has passed these preachings have borne some fruit. The engineer is today more prominently in the public eye than he has ever been before. Notwithstanding these facts, there appears to be an almost abysmal ignorance on the part of the layman as to what an engineer is and does. He knows that the engineer builds bridges, but he has no conception as to the designing of such structures, which must precede the construction. He knows that the engineer builds subway systems, railways, manufacturing plants and water-works, but his information does not extend to any conception of what the engineer must know and do to plan such works in an orderly and intelligent manner before the actual construction may begin.
>
> It is a fact that in his daily life the layman is in more frequent contact with the products of the brain and skill of the engineer than with those of any other calling, but he takes these things as much for granted as he does the sunshine and the rain.
>
> Each individual member of the profession has a duty to perform to attain the hoped-for ends. Each man may be and should be a focus of infection to his friends and neighbors and to others with whom he comes in contact. He should avail himself of reasonable opportunities to convey to the minds of others those things which the layman should know of the work of the engineer.
>
> The engineer is apparently often overlooked in the community in which he resides, and he has always seemed less ready to push himself forward and to express his thoughts than are men in other avenues of life. It is only when a man has achieved some degree of prominence that his words are likely to be heard with respect and attention; and the engineer, being in the mass modest, or one might say supermodest, appears to hesitate about taking issue on general subjects with other men who either have or assume positions of greater prominence.

Professor Wickenden, after outlining the evolution of the profession and its schools and societies, remarked that licensing gives only nominal protection of class status and that it has had only negligible effect in raising the professional standard. He offered a radical proposal to replace it: that the major engineering societies should certify engineers who have definitely arrived in experience and performance, by creating a higher membership grade which would constitute such a certified class. The proposal appeared to carry small conviction to those present, in spite of the speaker's brilliant reasoning.

The Union Terminal

Shaker Heights, a residential suburban development of O. P. and M. H. Van Sweringen, was the germ out of which grew first the concept of a surface rapid-transit railway to connect the new suburb with the heart of the city (the Cleveland & Youngstown Ry.), then out of this the project for a new main-line railway entrance into the city to bring together all lines, and finally the great Union Terminal project, on which some $150,000,000 has been spent for construction and equipment. Part of the development of the project was the purchase of the Nickel Plate from the New York Central, which was the starting point of the amazing chain of Van Sweringen railroad investments extending from Norfolk and New York to Denver.

NEW TERMINAL BUILDING GROUP DEVELOPS RIVER SLOPE AT EDGE OF CLEVELAND BUSINESS DISTRICT

In center, the terminal with its 52-story tower, as seen across the river valley. At right, commercial building erected over part of the east approach tracks. Additional building development over the tracks is planned.

W. E. Pease, chief engineer of the Cleveland Interurban Railroad Co., outlined the evolution of the Shaker Heights project—covering an area of some 5,000 acres—and stated that it led to the creation of the Union Terminal plan. Following, H. D. Jouett, chief engineer of the Cleveland Union Terminal Co., described the terminals plant, which includes a 34-track through station on the side slope of the Cuyahoga Valley just south of the Public Square and about 17 miles of approach line equipped for electric operation at 3,000 volts direct current. In answer to a question, he stated that trains will be able to traverse the new terminal trackage in as short a time as the old, in spite of the greater distance.

An elaborate statement of the structural problems involved in the terminal work was given by C. P. Marsh, engineer of structures of the terminals company. He dealt at great length with the difficult foundation problem presented by the plastic and sometimes sliding clay or silty loam substrata of the site. After borings and load tests, most of the works were proportioned for footing pressures of 6,000 lb. per square foot on spread footings. Some of the building column foundations were carried down in wells to depths of 70 to 90 ft. and there belled out, for pressures up to 12,000 lb. per square foot. The piers under the sixteen columns of the 52-story tower of the Terminal Building, with loads exceeding 8,000,000 lb. for the heaviest column, were carried down to rock, about 200 ft., by the open-well method; these piers are tied together by heavily reinforced-concrete members at the top. The substructure of the river bridge also was founded on concrete piers carried to rock in open wells, but the approaches rest on wooden piles.

Many difficult retaining walls and street bridges had to be built in the terminal and approach area. Both counterforted and cellular types were used. Construction was difficult, especially where street and railway traffic had to be maintained while the work was going on.

Wilbur J. Watson, consulting engineer, gave a full description of the structure of the Goodyear-Zeppelin airship shed at Akron, just put into service. The building has a floor area of 8½ acres and a volume of 55,000,000 cu.ft.

The main members are two hinged arches crossbraced by a stepped system of bracing, with successive vertical and horizontal trusses in place of the usual top-chord and bottom-chord system with swaybracing. This and the remarkable end doors—quarter paraboloids rolling on circular tracks around a center pin at the peak of the roof—constitute the chief distinguishing features of the general design, but the roofing (asbestos-protected steel, made by the Robertson Co., for outward or inward pressures of 80 lb. per square foot in the upper part, and 40 in the lower), the McArthur pile foundations, and the trucks and operating machines of the doors (built by Wellman-Seaver-Morgan Co.) are other noteworthy elements. A more detailed account of the structure will be published in these pages next week.

City Planning

For several years the City Planning Division has had under contemplation the production of a manual. The first tangible results were recorded in two reports, one on the scope of a complete city manual and the second on the problems relating to one phase, that of subdivision platting.

Hugh E. Young, engineer, Chicago Plan Commission, chairman of the manual committee, indicated that city officials, engineers and others sorely need information and guidance from the right kind of a manual which would embrace the carrying out of the various projects, including considerations involving the economics and the legal and financial elements. Mr. Young suggested a larger check list which members are asked to augment. Handbooks are available on particular elements of the work, but statements of principles and perspective are needed showing the relationship among esthetics, usefulness and foresight as applied to the various problems of engineering, architecture and economics involved. In a tentative outline he listed five major portions: (1) functional, dealing with such topics as streets, traffic, transportation and terminal; (2) recreation; (3) administration, covering civic centers and public building groups; (4) educational, including public lecture and concert facilities and the esthetics and psychology of city planning; (5) program.

Rolland S. Wallis, field secretary and research engineer of the Philadelphia Regional Planning Federation, in his report on the single topic of subdivision of urban land, indicated that the object would be to set forth generally accepted principles and criteria underlying the scientific design of a modern subdivision. Standardization cannot successfully be substituted for design. Rules to prevent some of the more obvious errors in land platting can be made, but the designer must have full opportunity to introduce better planning in his plats. A model ordinance to control but not standardize design is the aim.

After spirited discussion as to just how much of the subject of city planning to work on, the division voted to have perfected a separate manual on subdivision platting and one on through streets.

A wholly different subject was the presentation of an illustrated talk on the Cleveland metropolitan park system by W. A. Stinchcomb, director of the Cleveland Metropolitan Park Board. A half circle of parks and parkways, about 15,000 acres in extent, is being acquired around Cleveland, 10 to 20 miles from the heart of the city, utilizing broken land near streams having little value for residential or agricultural purposes. Money comes from a one-tenth mill tax, producing $290,000 per year, administered by a district which overlaps more than one county. Of special interest to engineers are the problems of drainage with the precipitous watershed, roads, bridges and stream cleansing, since many of the watercourses are badly fouled. So well has the sewage disposal been done that many of the streams now have far cleaner waters than portions of the lake. One of the lake-shore developments, Huntington Beach, was nearly ruined by the high water of last year, but has been preserved by a series of groins.

A Car-Dumper Plant

A paper presented by R. B. Leffler, engineer of bridges of the New York Central Railroad Lines West of Buffalo, on "Coal Dock and Car-Dumper Plant of the New York Central Railroad at Toledo, Ohio," in the meeting of the Waterways Division, pointed out several important developments in the design and operation of car dumpers for loading coal into lake boats.

Two car dumpers have been built by the New York Central Railroad on its dock on the east bank of the Maumee River at Toledo. The first or north car dumped was placed in service in 1926. The second or south dumper was put into service in 1929. Both car dumpers are of the elevating turnover type and are operated by electric power with automatic control.

The north car dumper, which handled 5,202,000 tons of coal in 1928, is similar to most of the car dumpers at other Lake Erie ports in being supplied by a gravity yard. This yard has five tracks of 60-car capacity. Car riders bring the cars down this 1.5 to 2 per cent grade to the barney under manual control and also ride the cars from the dumper through the kickback to the empty storage yard.

In designing the south dumper, which in itself is similar to the previously installed north dumper, available space would not permit construction of a gravity yard. A level load yard was built, consisting of six tracks with a capacity of 144 cars with alternate spacing of tracks of 16 ft. and 13 ft. c. to c. Space was thus provided for 36-in. gage electric car pushers to serve the tracks on either side. Car retarders to control the movement of the cars eliminate car riders.

It was brought out that while car retarders have been used to a limited extent at some seaboard ports this is the first installation on the Great Lakes. Retarders control the cars where the barney picks them up to enter the car dumper, again on the dumper itself, and again after leaving the kickback at the entrance to and in the empty yard. A car retarder has recently been installed on the platen of the cradle of the north dumper.

Experience in operating the north dumper, as well as the experiences at other points, showed breaking of wire rope to be a serious item of expense as well as delay. Renewal of ropes costs about $5,000, including labor and material, and takes about sixteen hours to make the change, which means a serious delay in operation of the dumper. At least one and more often two changes were required during the eight-months operating season.

Investigation by the author showed that the maximum service of the counterweight ropes, on which there are two reverse bends, averaged for the best grade of wire rope about 2,500,000 tons. The cradle-loop ropes, with one reverse bend, gave 3,212,000 tons. An analysis showed that reverse curves in the rope and small sheaves were largely responsible for the breakage.

In designing the south dumper, reverse curves were eliminated, and after considerable study the size of the sheaves was increased from 45 times to 60 times the diameter of the rope. Operation of the south dumper with these larger sheaves was continuous through 1929, and the same wire ropes are still in service. A total of 5,000,000 tons has been handled to date without renewal or evidence of appreciable wear on the original wire rope. All wire rope on the cradle is 1¼ inches in diameter.

The author expressed the opinion that these studies of the relationship of the size of the sheave to size of the rope and the elimination of reverse bends would be carried farther and applied to other equipment where wire rope is used.

Sanitary Questions

The Sanitary Engineering Division had a full program comprising two subjects. Sewage-works operation was the theme of a final printed report of 25 pages by a committee which worked on the subject for four years. Filtering materials for trickling filters was discussed in a symposium arranged by a special committee.

The operation report covered underlying principles necessary to satisfactory operation. It dealt with state supervision, financing, qualification and compensation of operators, schools, associations, analyses for the control of operation, records of accomplishments, research, cost data, reports, and essential laws and ordinances.

In discussion, C. K. Calvert, chemist, board of sanitary commissioners, Indianapolis, objected to setting up standard rates of pay for superintendents.

In regard to sewage rates of charge, F. H. Waring stated that there is no fixed ratio between water rates and sewage-service rates. At Dayton, Ohio, sewage-service charges average $4 per contributor, or $1 per capita per year. This pays for maintenance and operation and 50 per cent of fixed charges.

W. E. Stanley, of Pearse, Greeley & Hansen, Chicago, chairman of the committee on filtering materials, presented a general outline of the subject. Dr. Herbert F. Kriege, in charge of tests, France Stone Co., Toledo, presented a tentative set of tests for durability, primarily by the sodium-sulphate soundness test. Thirteen laboratories co-operated in the conduct of tests as outlined by the filtering-material committee during the past two years. Those eight or nine laboratories, which followed the method strictly, checked in classifying properly the ten kinds of slag and stone into sound, unsound and questionable groups.

Frank W. Jones, sanitary chemist with George B. Gascoigne, Cleveland, covered in his discussion the effect of filtering material on clogging and efficiency. The filter material may be responsible for clogging by disintegration and by surface conditions of the individual particles which hold back solids and prevent unloading. Size is a factor, as the smaller size has fewer voids. The filter medium should be permanent in form and condition. The relative advantages of smooth and rough material have not been established, but surface texture must be such as to secure adherence of gelatinous films and still permit a free sloughing of stored solids. Disintegrations and consolidations induce clogging.

Charles C. Hommon, engineer in charge of sewage treatment, Canton, Ohio, discussed clogging and efficiency as affected by operation. Self cleansing is not entirely satisfactory. Unloading periods are beyond the control of the operator. Drying one day in seven, carried out at Canton for killing surface algæ, also causes surface growths to slough. The one day was not sufficient to penetrate appreciably, but seven days penetrated 12 in. Flooding for control of flies later flushed off deeper deposits. As indicated by nitrate content, the purification agencies are not detrimentally affected by the interruption of service.

The question of the division going into water, so vigorously discussed in New York last winter, was again up and this time it was voted to feature water at the spring meeting in Norfolk.

Proposed amendments to the constitution of the society, increasing the requirements for membership, were adopted by the convention and ordered to letter ballot. The essential features increase the minimum age of eligibility for juniors from 18 to 20 years, for lower corporate members from 25 to 27 years, for upper corporate members from 32 to 35 years. Juniors must transfer to a higher grade at 33 instead of 32. Members must be able not only to direct engineering work but "to conceive or design." Affiliates must have the same qualifications in their allied fields as have members in engineering. The questionnaire on which the above-mentioned changes are based indicated that no change was desired in the matter of giving a new name to the upper corporate grade or creating a new grade.

Tests on Flame-Cut I-Beam Clips

By W. S. Wolfe

Chief Structural Engineer,
Smith, Hinchman & Grylls, Detroit, Mich.

IN MANY of Detroit's largest steel-frame buildings extensive use has been made of I-beam clips similar to those shown in *Engineering News-Record* of April 24, 1930, p. 684. It is standard practice to flame-cut these clips from the rolled section. The article "Practices in Flame-Cutting of Steel Reported Harmful," which appeared in that paper, raised the question as to whether or not flame-cutting seriously weakened the material. As a result of the discussion of this matter, tests of specimens furnished by Whitehead & Kales, Detroit, were made at the laboratory of the city's building department.

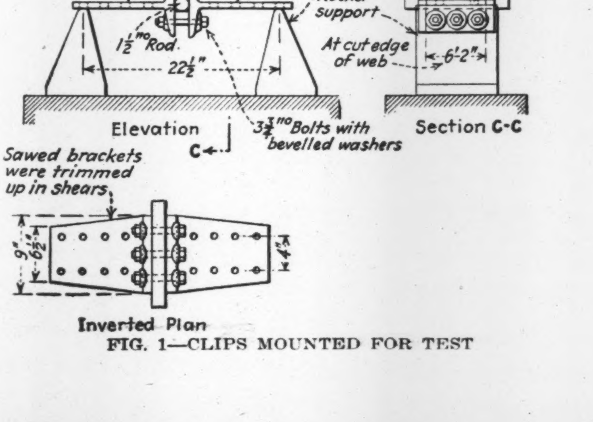


FIG. 1—CLIPS MOUNTED FOR TEST

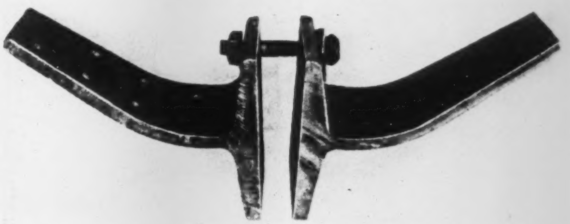


FIG. 2—RESULT OF BENDING TEST

Ten test pieces cut from the same 24-in. I-beam were prepared, assembled in pairs for testing as shown in Figs. 1 and 2, equal loads being applied at points marked "Load." The table shows the arrangement of the different clips and the load at which the yield point was reached, as well as the maximum load. The load is the total for each pair of clips. Attention is called to the various combinations of test pieces. For instance, in test No. 1, one of the pieces was sawed and then punched, while the other was flame-cut and then punched. In test No. 3, one test piece was punched and then flame-cut, while the other was flame-cut and then punched.

The surprising thing about the results is their uniformity. Certainly there is nothing which could be taken as proving that the flame-cutting had seriously weakened the material. None of the test pieces cracked, but all bent to a nice smooth curve, as shown by their photographs after testing, while the loads which were supported indicate that all the test pieces withstood very high unit stresses as well as severe distortion.

TESTS OF FLAME-CUT CLIPS

Test	Test Piece *A*	Test Piece *B*	Yield Point	Max. Load
1	Sawed, then punched.......	Flame-cut, then punched..	5,500	7,520
2	Punched, then sawed.......	Punched, then flame-cut...	5,200	7,200
3	Punched, then flame-cut....	Flame-cut, then punched..	5,000	7,200
4	Sawed, then punched.......	Sawed, then punched......	5,200	7,700
5	Flame-cut, then punched ..	Flame-cut, then punched..	5,000	7,200

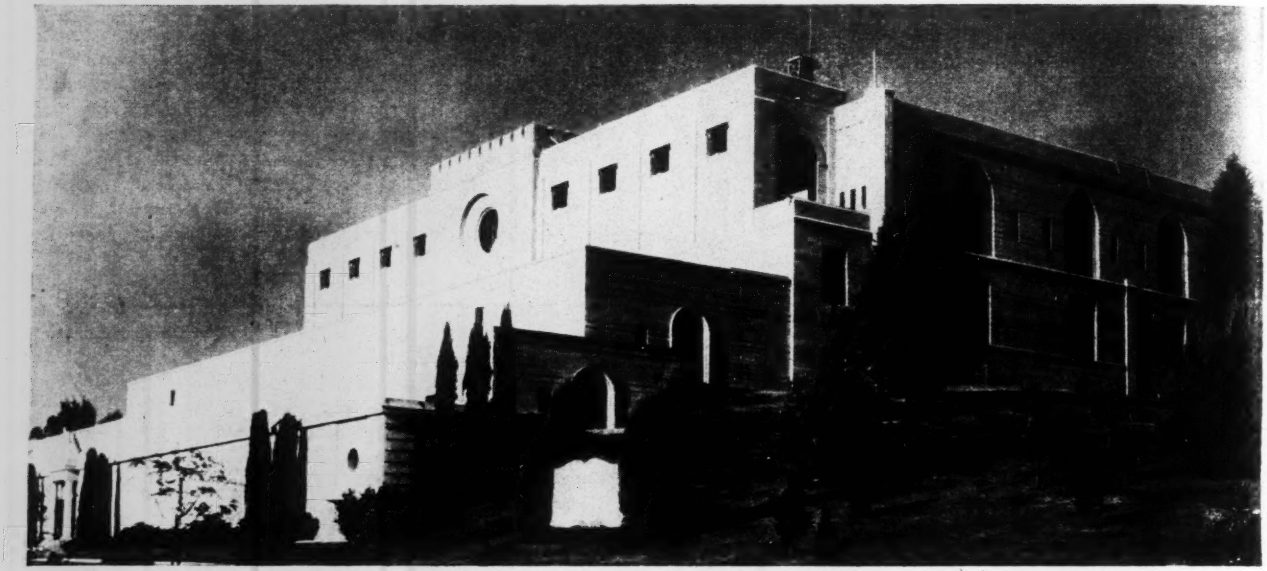


FIG. 1—FOREST LAWN MAUSOLEUM, GLENDALE, CALIF.

Decorative Effects in Concrete

Poured-in-Place Ornamentation on California Mausoleum Makes Use of Plaster-Cast Forms and a Talc Admixture—Exposed Structural Beams Poured in Glued Wood Forms Inside Heavier Forms to Eliminate Wire Ties

By Frank R. Wicks
Consulting Mining and Industrial Engineer, Los Angeles, Calif.

A NOTEWORTHY example of the pleasing and effective architectural results that may be accomplished by poured-in-place ornamentation is to be seen in the concrete work at the Memorial Terrace Mausoleum in Forest Lawn Memorial Park, near Glendale, Calif. The first units of this mausoleum were erected a few years ago, at which time the exterior of the first story was finished with cut-stone blocks. However, subsequent developments in the production and placement of concrete for exterior finish and for decorative work made it possible to use this method for the remainder of the structure. Important factors in the success of the work were careful selection and grading of aggregate and the use of a talc mixture in the concrete to produce the high degree of workability and plasticity necessary to insure the complete filling of forms. The second and third stories of the building, which are also a portion of the original concrete structure, were given a veneer coat of 8 in. of new concrete. This was designed to harmonize with the newer portion of the building above, as may be seen in Fig. 1.

The front of the building presents an impressive appearance on account of the long, unbroken, indented belt-courses and the bracketed coping along the top of each wall. Just above the large circular window and below the battlement at the center of the upper story is a frieze made up of a combination of triangles and diamond-shaped blocks. The semicircular arched windows and doors on the second and third floors have a wide casing decorated with small rectangular blocks, while the upper circular arches have plain casings with a border of small triangles above. All of these designs were built into the forms with wooden blocks and then poured monolithic with the walls.

The pointed arches have a plain detail casing, also poured integral with the wall, with recesses to receive cut-stone ornamentation. Where the stone is to be placed, the concrete was poured with a slightly honeycombed surface to assure a better bond for the mortar. Elsewhere the concrete was poured smooth. All openings are designed to receive bronze frames or sash for leaded-glass windows.

Forms of Plaster—The circular windows, of which there will be several in the completed structure, were produced by the use of plaster castings for forms. These plaster shapes were molded over wooden frames (Fig. 2) and then given a coat of shellac before being placed. Concrete poured against these plaster forms shows an extremely smooth and uniform surface, and the shellac effectively prevents bond between the concrete and the form. Each form is used only once, and each circular window is of a different design.

Another result of the use of the plaster-cast form is to be seen in brackets placed on two sides of the building, shown in Fig. 3. A pattern of hand-carved wood was used for making the plaster molds, which were then assembled in a long boxlike form and placed into the wall forms. Thus the wall and brackets and the coping could all be poured at one time. When the photograph was taken the work had not yet been washed or brushed down.

Among the various designs of copings, etc., there were three styles of smaller brackets which required carved-wood patterns from which plaster molds were made. By exercising care in placing the concrete in these molds and by varying the amount of tamping, it was found that some brackets could be cast smooth and others with a slightly pitted or honeycombed surface. This was done to lend variety to the whole design, and the results were very satisfactory. The pitted surfaces were not sufficiently roughened to expose the aggregate.

In one instance, where the design of the bracket was curved and fluted, having the shape of half an acorn, the mold used was partly plaster and partly wood, all made from a hand-carved pattern. These smaller brackets of intricate design were used chiefly on interior ornamentation work.

The concrete in walls and columns and in the main beams and most of the exterior decorative work, is a $1:2\frac{1}{2}:3\frac{1}{2}$ mix, containing $2\frac{1}{2}$ to 3 lb. of talc admixture per sack of cement. The maximum size of rock used in this class of work was $\frac{3}{4}$ in. Tests showed a seven-day strength of 2,230 lb. per square inch and a 28-day strength of 3,450 lb.

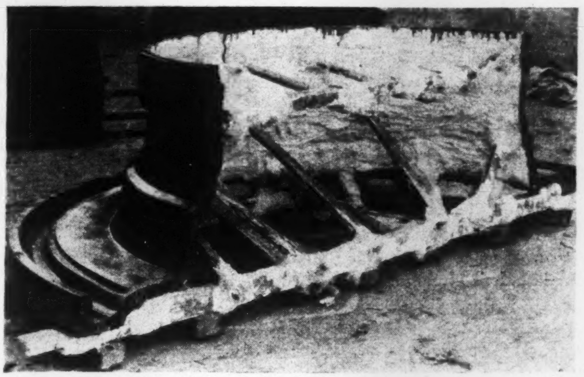


FIG. 2—MAKING A PLASTER-CAST FORM FOR A CIRCULAR WINDOW

Plaster was molded over a wooden frame and then given a coat of shellac to eliminate bond with concrete.

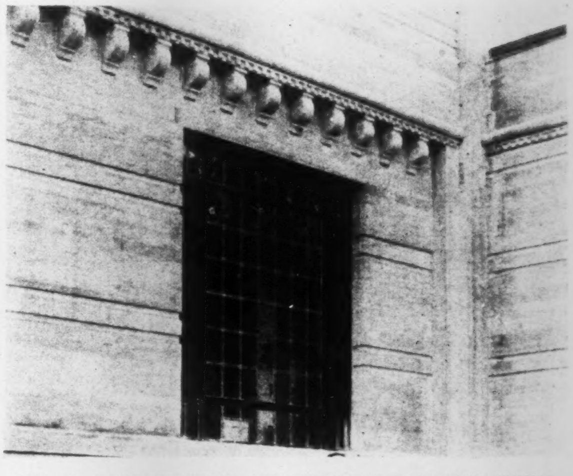


FIG. 3—POURED-IN-PLACE BRACKETS MADE WITH PLASTER-CAST FORMS

In the interior of the building, the ceilings and many of the beams are of exposed concrete, although some portions of the interior walls are covered with marble. In some of the corridors and larger rooms the arched ceiling beams are of exposed concrete with a variety of detail, consisting of large and small panels and geometrical designs in deep relief. One of these designs is shown in Fig. 4. This photograph was taken while the forms were being removed. In the smaller rooms and at the ends of the corridors where the ceilings are flat instead of arched the entire ceiling area is set off in square panels, as shown in Fig. 5. Each of the rooms and each bay in the main corridors possesses a slightly different design of panel work, the variation being accomplished by different designs of molding, by difference in depth of relief, by change in the size of the individual panel or by variation in geometrical design. All of this work was done by poured-in-place concrete, using a pea-gravel mix of the proportions of $1:1\frac{1}{2}:3$, containing the talc admixture in amounts equal to about 4 per cent of the weight of the cement used. In a few places where the forms were rather more difficult to fill, the proportion of the admixture was increased to 6 per cent. In order to get good results on such construction as is shown in the arched ceiling beams, a relatively dry mix was required, but one that was both plastic and workable. The concrete had to be plastic enough to be worked into every portion of the form and stiff enough to hold the arched shape at the top of the beams without creeping. For this work the talc admixture proved very valuable, as it has the property of softening and lubricating the mix and at the same time reducing the amount of mixing water required, thus eliminating substantially all of the water pockets and sand streaks on the surface of the completed concrete. No precast panels or precast sections were used and no patching, brush-coating or chisel work was required after the removal of the forms. The ornamental concrete work was brushed down with a wire brush, washed thoroughly with water and allowed to dry slowly, after which it was ready for painting and decorating. In no case was a cement brush coat or plaster finish used.

It will be noted that where the ceilings and beams were to be left exposed no tie rods or form ties were used, thus avoiding any necessity for patching and also avoiding the possibility of discoloration of paint by iron rust. In such places and also where it was desirable to avoid showing the marks of end cuts in form lumber, the forms were built of 1-in. stock, with ends glued and with the sides held together with wiggle-nails. These forms were then inclosed in form boxes made of 2-in. planking

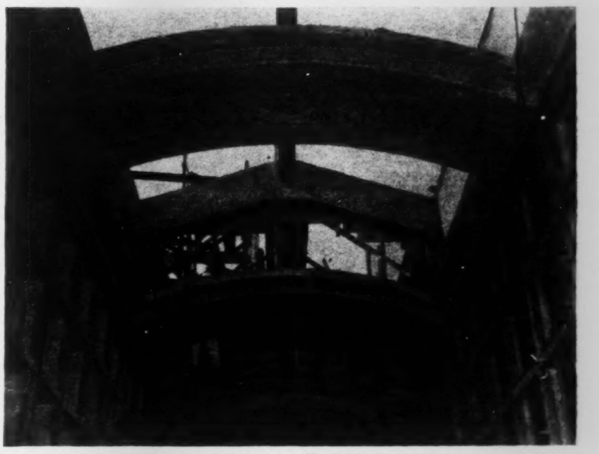


FIG. 4—CEILING BEAMS IMMEDIATELY AFTER FORMS WERE REMOVED

Double forms were used for this work, the interior set having glued joints. By the use of this double set of forms it was not necessary for wire ties to pass through the concrete. The outer set of forms constituted the structural support.

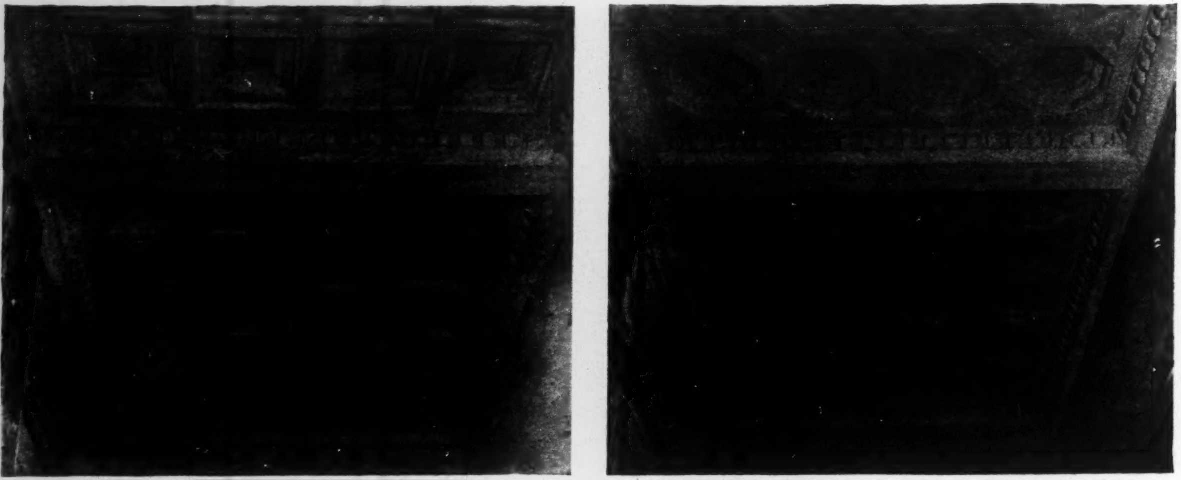


FIG. 5—TWO DESIGNS OF POURED-IN-PLACE CEILINGS

to carry the weight. Form lumber was all vertical-grained, usually surfaced on one side and two edges, with the rough side placed to the wall. This gave a better texture to the wall than would have been obtained by pouring against the planed side, and also served to contrast the flat surfaces when viewed alongside of the rounded or milled shapes, which, because of the care exercised, were particularly smooth.

For the production of the various shapes of panels, brackets, etc., a great variety of milled moldings was required. A sketch of each shape was furnished to the mill, and the moldings were delivered to the job in stock lengths. All formwork, including the plaster castings, panels, etc., was done at the building. Considerable use was made of a composition wood in the forms for the flat surfaces in the panel work, and for the indented-panel effect produced in the concrete in the sides and top of each crypt. This material was easy to work, could be cut and mitered with a knife when desired, and was found very durable.

The architectural and structural designs of the mausoleum were prepared by the architectural department of the Forest Lawn Properties Association, owner and builder. This work was under the direction of David C. Allison, the consulting architect, and E. W. Cunningham, structural engineer. The field work was handled by Howard J. Wallace, chief engineer of the Forest Lawn Association, and the erection work was under the direct supervision of Clyde A. Maclaren, construction superintendent.

Largest Dams in the United States and Abroad

Tables Prepared by P. I. Taylor, Assistant Engineer, Washington Office, Bureau of Reclamation, for the "New Reclamation Era," Give Data on the Highest and Largest Structures Both in This Country and in Foreign Countries

DAMS IN THE UNITED STATES

Name	Location	Type	Height, Ft.	Volume, Cu.Yd.
Boulder[1]	Arizona-Nevada	Concrete gravity	700	....
San Gabriel[2]	California	Concrete arch gravity	500	3,800,000
Owyhee[3]	Oregon	Concrete arch gravity	405	550,000
Diablo[3]	Washington	Concrete arch	400	275,000
Pacoima	California	Concrete arch	380	238,000
Pardee	California	Concrete arch gravity	357	615,000
Arrowrock	Idaho	Rubble conc. arch gravity	349	585,130
O'Shaughnessy	California	Cyclopean masonry, arch gravity	344	390,223
Exchequer	California	Concrete arch gravity	330	440,000
Salt Springs[3]	California	Rockfill, concrete face	330	3,000,000
Shoshone	Wyoming	Rubble concrete arch	328	78,576
Kensico	New York	Cyclopean masonry, gravity	307	900,000
Elephant Butte	New Mexico	Rubble concrete gravity	306	605,200
Horse Mesa	Arizona	Conc. variable radius arch	305	147,357
Dix River	Kentucky	Rockfill	275	1,747,000
Lake Pleasant	Arizona	Concrete multiple arch	256	72,000
Coolidge	Arizona	Concrete multiple dome	249	187,000
Cobble Mountain[3]	Massachusetts	Hydraulic earthfill	245	1,800,000
Tieton	Washington	Earth and rockfill	222	1,995,000
Calaveras	California	Semi hydraulic fill	215	2,700,000
Gatun	Canal Zone, Panama	Earthfill	115	22,958,000
Saluda[3]	South Carolina	Semi hydraulic fill	208	11,000,000
Wachusett North Dike	Massachusetts	Earthfill, sheetpiling core	80	5,500,000
Englewood	Ohio	Hydraulic earthfill	120	3,500,000
Standley Lake	Colorado	Earthfill, puddled core	113	3,250,000
Lower San Fernando	California	Semi hydraulic fill	123	2,713,000
Scituate	Rhode Island	Earthfill	180	2,500,000
San Pablo	California	Hydraulic earthfill	110	2,250,000
McKay	Oregon	Gravel fill, conc. paving	160	2,313,000

[1] Authorized for construction. [2] Construction work suspended [3] Under construction.

DAMS IN FOREIGN COUNTRIES

Name	Location	Type	Height, Ft.	Volume, Cu.Yd.
Schraeh	Switzerland	Concrete, gravity	362	305,000
Camarassa	Spain	Concrete arch gravity	335	283,140
Talarn	Spain	....	330	....
Bhandardara	India	Concrete, gravity	282	444,444
Suviana	Italy	....	279	340,000
Chavanon	France	....	279	....
Montejaque	Spain	Concrete arch	273	....
San Antonio	Spain	Concrete arch gravity	269	351,000
Assume	Egypt	Concrete gravity	115	1,200,000
Grimsel	Switzerland	Concrete, gravity	266	....
La Boquilla	Mexico	....	261	390,000
Rodrizuez[1]	Mexico	Ambursen	255	300,000
Barberine	Switzerland	Cyclopean conc. gravity	252	275,000
Burrinjuck	Australia	Cyclopean masonry, curved gravity	247	320,000
Camplicciolì	Italy	Concrete, arch gravity	246	301,300
Tirso	Italy	Multiple arch	239	214,000
Hume[1]	Australia	Earth embankments, concrete spillway	200	[2]4,433,000
Don Martin[1]	Mexico	Earth embankments, concrete spillway	105	[3]2,675,000
Necaxa No.	Mexico	Hydraulic earthfill	190	2,300,000
Assuan	Egypt	Concrete gravity	115	1,200,000
Patillas	Porto Rico	Semi-hydraulic fill	147	920,000
Lloyd	India	Rubble masonry	190	80,000

[1] Under construction. [2] 3,900,000 earth, 533,000 concrete. [3] 2,500,000 earth, 175,000 concrete. [4] Construction work suspended.

Engineering Literature

A Monthly Review of Books and a Listing of New Publications

How Washington Was Planned

L'ENFANT AND WASHINGTON, 1791-1792. Published and Unpublished Documents Now Brought Together for the First Time—By Elizabeth S. Kite. Introduction by J. J. Jusserand, Ambassador of France to the United States (1902-1925). Foreword by Charles Moore, Chairman, National Commission of Fine Arts. Baltimore: The Johns Hopkins Press. Boards, cloth back; 8x10½ in.; pp. 182. $3.

THE PART taken by L'Enfant 140 years ago in laying out a plan for the American capital in the wilderness of hill and marsh adjoining the Potomac River has been the subject of much writing of late. It would not be easy to say whether he or his plan was more nearly forgotten from early in the last century until early in the present one. Both came prominently to the front when a return to the plan was made some 30 years ago.

Although there has been a general willingness if not eagerness recently to give L'Enfant full credit for his plan of Washington, there have been occasional exceptions. Some writers have tried to detract from the French engineer and architect by bestowing credit on Jefferson, Washington or Ellicott, the latter an engineer who assisted L'Enfant. There has also been criticism of L'Enfant for actions that led to his resignation after two or three years of service.

The facts in the case are established by the present volume of documentary evidence, some of it published for the first time, consisting largely of letters by L'Enfant, Washington and Jefferson. Those who do not wish to read all the documents and who would like also a background sketch which, among other things, tells of L'Enfant's aid in the American Revolution, will find serviceable an Introduction to the volume, entitled "Major L'Enfant and the Federal City," by J. J. Jusserand, lately French Ambassador at Washington, taken from "With Americans of Past and Present Days."

It is interesting to note that L'Enfant wrote to Washington (Sept. 11, 1789) expressing his desire to plan the "Federal City" and saying that "No nation had ever before the opportunity offered them of deliberately deciding on the spot where their capital city should be fixed," and stating that while the "means" of the country were then inadequate "to pursue the design to any great extent," the plan should be drawn on such a scale as to leave room for that "aggrandizement and embellishment which the increase and wealth of the nation will permit it to pursue at any future period however remote." The correspondence given in this book ended April 1, 1792, with a letter from L'Enfant persisting in his declination to reconsider his resignation, brought about through his unwillingness to accept directions from the government commissioners regarding parts of his work which he thought should be within his own control. The disagreement centered in the demolition by L'Enfant's order of a building which he considered to be a trespass upon his plan. From this distance of time it appears that L'Enfant should have yielded, but it can also be seen that from his viewpoint that was impossible.

L'Enfant remained in this country until his death in 1825, in Washington. Meanwhile he did some work elsewhere, but apparently it produced little income. At his death he possessed three compasses, three watches, some books and maps and $46.

It is a pity that one who contributed so much to his adopted country and to the art of city planning as did L'Enfant should not have been able to carry out his plan and should have passed the last three decades of his life under clouds. A century later recognition of his services began. It has continued since. Besides doing him justice, the present useful and handsome volume will help perpetuate his memory, but the plan for our national capital is his fittest and most lasting monument.

Continuous Structures

REVIEWED BY A. FLORIS

Civil Engineer, Los Angeles, Calif.

CALCUL GRAPHIQUE des poutres continues à palées solidaires à fibres moyennes rectilingnes, brisées ou courbes—Par Bela Enyedi, Docteur-Ingénieur. Traduit du Hongrois par Gabriel Hoffner, Ingénieur. Paris: Le Constructeur de Ciment Armé. Paper; 10x6 in.; pp. 154; 43 line cuts in the text and 4 plates. 25 francs in France.

THE graphical analysis of continuous beams is based, as is well known, on Mohr's theorem pertaining to rotations and displacements of loaded beams. By utilizing this theorem W. Ritter has treated the continuous beams of constant moment of inertia. His simple and elegant solution of the problem is common knowledge among structural engineers. Later, Professor Kherndl, Budapest, has applied this method of analysis to continuous beams of variable moment of inertia, thus amplifying and improving W. Ritter's original and useful ideas.

The author of the present work, going a step farther, has developed by purely synthetic means a decidedly new method of great generality and beauty. It is applicable to continuous frames of the most complicated form and results can be obtained quickly, even in cases where analytical methods would be impracticable.

Introducing, in a continuous structure with an immovable column head, the fixed frame as a base system, and taking the moment areas of the statically indeterminate quantities as vectors acting perpendicularly to the plane of the frame, Dr. Enyedi was enabled by the aid of projective geometry to arrive at surprisingly simple results. Thus, in a continuous frame to the right and left of a column a fixed point and also a vertical line going through each of these points are assumed. The fixed points, determined in this way, play the same rôle in the analysis of continuous frames as the fixed points of Ritter's method in the continuous beams, although they are determined in an entirely different way.

Numerous applications of the theory to special cases, with steady and moving loads, are given by the author, and several numerical examples are worked out completely.

Although continuous frames are not in vogue in this country, nevertheless continuous beams are widely used and multiple arches in bridges and in other similar structures are of frequent occurrence. For this reason the book under review will undoubtedly interest those who respond to novel and unusual but also practical methods of analysis. It represents a marked advance in the theory of continuous structures and as such it is warmly recommended.

How to Locate an Industrial Plant

PLANT LOCATION—By W. Gerald Holmes, Industrial Engineer. New York and London: McGraw-Hill Book Co., Inc. Cloth; 6x9 in.; pp. 275; halftones, line cuts and tables. $3.

WHERE to locate an industrial plant is not so simple a question to answer as it was in earlier days when operations were on a smaller scale, markets were nearer at hand, competition was less keen, and getting goods from the factory to the consumer did not represent so large a part of the cost of production. Fortunately many bright minds have given much study to problems of plant location and specialists stand ready to come to the aid of the growing number of those who see the advantage of employing them. Altogether quite a bit has been written on plant location, but it has been scattered here and there. This fact, combined with the growing importance of the subject makes doubly welcome this comprehensive review of plant location.

After a brief Introduction the author takes up the broader aspects of this subject under the heading, Choosing the General Territory. He considers markets, raw material, transportation facilities, freight rates, fuel and power, labor and wages, laws and taxation, and miscellaneous factors. This broad survey made, Choosing the Particular Community is considered. The main topics here are size of the community, labor, electric power, transportation, community attitude and data gathering. It will be seen that somewhat the same ground is gone over as in Part I, but with a closer approach to location of the proposed plant. Part III, Choosing the Site, comes still closer. Railway facilities and labor are again considered. Then local transportation, special requirements and size and cost of plant, the topographical map and available buildings are taken up. An appendix summarizes a plant location survey covering the United States and Canada, made by the policyholders' service bureau of the Metropolitan Life Insurance Co. in co-operation with the National Electric Light Association, during which 10,267 plants in the United States and Canada were considered.

The book should be useful not only to those who are seeking a site for new industrial plants but also to plant owners and managers, most of whom need to consider from time to time whether a move to another locality might benefit their enterprise and their customers. Written as the book is from an engineering viewpoint, it should have a strong appeal to many engineers.

The Machine: Slave or Master?

MACHINE-MADE MAN—By Silas Bent, Author of Ballyhoo, The Voice of the Press. Woodcuts by H. Glintenkamp. New York: Farrar and Rinehart. Cloth; 6x9 in.; pp. 341. $3.50.

DIVERGING from the usual pattern in works of this nature, Mr. Bent attempts to present facts rather than opinions; history in place of argumentation. By far the greater portion of his book consists of what might be termed a series of outlines dealing with such fundamental subjects as food, clothing, shelter, communication, transportation, amusements and other human needs. Even though these chapters are, necessarily, greatly condensed the reader will obtain from them much interesting information on the various ways man has adopted throughout the ages to satisfy his many wants. The data presented appear to be, in the main, accurate, although the author errs in referring to certain parts of the water-supply systems of New York City and San Francisco as completed undertakings, when, as a matter of fact, construction work is still in progress. Even Patrick McGovern did not complete 20 miles of large deep water tunnel beneath New York City in a single year.

In his final chapter Mr. Bent draws some conclusions encouraging to those who fear the standardizing effect of machinery upon mankind. To the machine, he finds, should be credited an increase in the amount of leisure available to the average worker. How this time is utilized, he believes, is the final test of the value of our industrial development. Admitting that there are still many problems to be solved and that the final outcome is by no means assured, it is nevertheless true that the machine "has engendered a cult of competence and efficiency." On the whole, Mr. Bent inclines to the belief that the benefits of the machine age outweigh the disadvantages.

Thomas' Bacteriology Enlarged

REVIEWED BY HARRY E. JORDAN

Filtration Engineer, Indianapolis Water Co., Indianapolis, Ind.

BACTERIOLOGY: A Textbook on Fundamentals—By Stanley Thomas, Professor of Bacteriology, Lehigh University. Second edition, revised and rewritten. New York and London: McGraw-Hill Book Co. Cloth; 6x9 in.; pp. 301; frontispiece portrait of Louis Pasteur and 33 line cuts and halftones. $3.

THE PRESENT, or second, edition of this book has been increased by half in size, rearranged, expanded and otherwise changed. The additions include a chapter on Cultivation of Bacteria. Sanitary engineers will be particularly interested in the chapters on bacteria in water and sewage. There is a very good paragraph (p. 165) on the significance of bacteria in water:

> No really satisfactory method has been devised for distinguishing between human intestinal organisms recently gotten into the water, on the one hand, and both old attenuated human strains and animal strains, on the other. Moreover, it is a fact that, in fæces from a typhoid-fever patient, the harmless intestinal bacteria far outnumber the typhoid germs. There comes a point in dilution, therefore, where the presence of B. coli may not indicate the presence of disease germs. Until these questions are satisfactorily answered, bacteriologists will continue to condemn water supplies which are probably no more dangerous than the ordinary hazards of life. In our present state of knowledge, no one wants to assume the responsibility of recommending a water for drinking purposes when there is the slightest possibility that it may carry dangerous disease germs.

The first edition of the book appeared five years ago (see review by the present writer, *Engineering News-Record*, Nov. 19, 1925, p. 847). It has been found useful to a water-works laboratory staff to hand to various interested persons as a means of adult education in bacteriology. Reverting to the present edition:

The section on Natural Purification of Water would be materially improved if it were correlated with the published work of Streeter and his associates on stream pollution studies. Under Rapid Filters, the author states: "The filters are cleaned by reversing the flow and at the same time agitating the sand and gravel by mechanical arms and rakes. Recently, compressed air, admitted from beneath, has been used to great advantage. The action of rapid sand filters is purely mechanical; no time is allowed for any biologic action."

It would profit the student who uses the book if the first quoted paragraph were edited in 1930 terms and in the light of the Detroit studies on filter washing. The second sentence quoted is unfortunate. Rather can it be said that "The action of rapid sand filters is largely mechanical; little time is allowed for biologic action, but distinct evidence exists that biologic action contributes to the efficiency of such filters."

While the chapter on Bacteria in Sewage is in the main satisfactory, more space could be given to activated sludge. References later than 1917 should be given. The statement on p. 195 "The purification of sewage by electric current is finding wide application" was objected to by the reviewer in the case of the first edition. That objection is repeated. The statement is incorrect. It should be deleted.

It is again possible to approve the chapter on Bacteria in Industry. In it the author describes the agency of bacteria in the production of industrial alcohol, glycerine, citric and lactic acids, butanol and acetone as well as the activity of bacteria in leather manufacture, flax, hemp and jute preparation and associated processes.

In spite of the specific instances of needed correction in the text, the writer knows of no better brief introduction to general bacteriology.

Water Power in Germany

WATER POWER EXPLOITATION IN GERMANY: Special Publication for the Session of the Second World Power Conference, Berlin, 1930, with the Assistance of the Governmental Departments of the Reich and the German States. Berlin: Deutscher Wasserwirtschafts- und Wasserkraft-Verband E. V. Cloth; 8½x12 in.; pp. 387; many tables; plain and colored folding maps, plate for each German state with a halftone view and a coat-of-arms in colors; 123 other halftones on plates; line cuts, including sketch maps.

DIE NORDISCHEN WASSERKRÄFTE: Ausban und Wirtshaftliche Ausnutzung—Von Dr.-Ing. Dr. Techn. H. C. Adolf Ludin, ord. Professor an der Technischen Hochschule zu Berlin. Unter Mitarbeit von Dr.-Ing. Paul Nemenyi, Diplom-Ingenieur. Berlin: J. Springer. Cloth; 8x11 in.; pp. 778; line cuts, halftones and tables. 160 marks.

SPECIALLY published for the World Power Conference in Berlin and dedicated to the delegates attending the conference, the first of the two books listed above makes available for the first time a comprehensive review, written in the English language, of water power development in Germany.

The book is much more than a simple cataloging of plants. It covers the geological characteristics of the country, precipitation and river discharge, and types of power plants developed to meet different conditions, and gives general statistics as to operating and economic conditions. The descriptions of the individual plants are quite complete and, in addition, where special construction difficulties were encountered, the method of constructing the plant is described briefly.

Except in the case of the plants along main waterways, such as the Rhine-Main-Danube waterway, the plants are grouped geographically, and in this way the presentation of information as to their interrelation is facilitated.

No comment upon the book would be complete without an expression of admiration of it as a piece of exceptionally fine bookmaking. The type is large and clear, the maps and drawings are well made and the halftone plates, printed on coated stock, are beautiful reproductions of the original photographs.

The book is published by the Deutsche Wasserwirtschafts und Wasserkraft-Verband E. V. (the German Water Economy and Water Power Association), the leading organizations of German hydro-economics, having a membership of 25,000. There is also an edition of the book printed in the German language.

Dr. Adolf Ludin, one of the authors of the book just noted, has written a book similar to it in content. The fact that it is written in German will restrict its usefulness in this country, but fortunately it is so full of line drawings that one hardly needs to be able to read the text to get an understanding of the subject matter. In this respect the book is much more complete than the one on German hydro-electric plants. Such matters as energy destruction, fish ladders and methods of protecting power plants against logs being floated down the river are dealt with at some length. Construction problems, such as stream diversion, tunneling and methods of placing concrete are also discussed. There also is a chapter on transmission towers.

River and Harbor Construction Work

TRAVAUX MARITIMES—Par P. Lévy-Salvador, Ingénieur des Constructions civiles, and Louis Prudon, Ingénieur des Travaux Publics de l'État Service maritime au Havre. Bibliothèque de L'Ingénieur de Travaux Publics. Tome Premier. Paris: Dunod, 92, Rue Bonaparte. Paper; 5x7½ in.; pp. 528; illustrations and tables. 65.5 francs in paper, 77.8 francs bound.

THE great majority of the problems met in river and harbor work and in shore protection are dealt with in this book. It opens with a discussion of tides and tidal phenomena and methods of measuring and recording tide variations. Then comes a discussion of shore formation, sand bars and deltas, roadbeds and natural and artificial ports. The third chapter discusses at considerable length the methods of deepening channels and maintaining them in an open condition. Methods of establishing communication across navigable waterways, by fixed and movable bridges, are the subject of another section. In a chapter on rivers and maritime canals, much information is given on the subject of the maintenance of shores and channels. Shore protection, chiefly against wave action, is taken up. Other subjects covered are the stability of ships and methods of salvaging them and the effect of sea water upon various materials.

Materials and Mechanics

MATERIALS OF ENGINEERING CONSTRUCTION—By Francis W. Roys, M.Am.Soc.M.E., Professor of Mechanical Engineering, Worcester Polytechnic Institute. New York: Ronald Press Co. Cloth; 6x9 in.; pp. 331; 167 line cuts and halftones. $4.

APPLIED MECHANICS—By Frederick N. Weaver, Assistant Professor of Civil Engineering, Tufts College; Assoc.M.Am.S. C.E. New York: The Ronald Press Co. Cloth; 6x8½ in.; pp. 322; line cuts in text. $3.25.

THESE two textbooks are considered here together as a means of emphasizing the fact that a relationship exists between their subjects which might be fostered with profit in a college curriculum. Mechanics is probably not as closely associated with a study of the characteristics of engineering materials as is strength of materials. But being a study of the relations between forces and their effect on the equilibrium of bodies of material, beginning students in mechanics would benefit from a concentrated knowledge of materials such as Professor Roys' book offers.

Materials of Engineering Construction is a college textbook which might be described as a glossary of characteristics and properties of wood, lime, plaster, cement, stone, clay products, iron, steel and the nonferrous metals. It is brief and easily read. At the end of each chapter are given several references to more advanced books, lists which should prove useful to the general reader as well as to the student.

Professor Weaver's book on mechanics coincides with the usual practice in the preparation of texts on this subject—namely, that it is based on the author's concept of the manner in which the subject should be taught and in which he has been teaching it. "A course in applied mechanics," writes Professor Weaver in his preface, "should be mathematical in tone, employ a proper degree of rigor in proofs and exposition and yet, by choice of illustration, relate the fundamental theory to the professional work that the student will later be called upon to perform." The book departs from conventional arrangement by delegating the topics of center of gravity and moment of inertia to the appendix, on the assumption that the student has at least an elementary knowledge of them from mathematical courses. A distinct innovation in an elementary textbook is the inclusion of an appendix chapter on the loaded cable of the suspension bridge, which considers both parabolic and catenary shape theories.

Real Estate Practice

PRINCIPLES OF REAL ESTATE PRACTICE—By Roger D. Washburn, B.B.A., Director of the course in Real Estate Methods, College of Business Administration, Boston University. New York and London: McGraw-Hill Book Co., Inc. Cloth; 6x9 in.; pp. 625; illustrations. $5.

THE MANY thousands of people who make their living from transactions in real estate or depend in large degree upon the results of such transactions should welcome this comprehensive treatise. Its four parts deal with (1) the essentials of the real estate business; (2) the various classes of real property; (3) problems of regulation, zoning, taxation and appraisal; (4) the many legal aspects of the subject, such as ownership, agreements, deeds, title regulation, liens, real estate trusts and finally real estate boards and business ethics. Many legal decisions are cited. Although designed primarily for students and for real estate operators, the book would be useful to many real estate owners and managers and to engineers who in one way or another have much to do with real estate.

Publications Received

PAMPHLETS dealing with Training Plans for Office Employees, Vacations for Industrial Workers and Budget Methods of the Brick and Clay Industry may be had from the Policyholders' Service Bureau of the Metropolitan Life Insurance Co., 1 Madison Ave., New York City.

FOUR AUTOMOBILE MAPS of Canada and of the United States as far south as Washington, St. Louis, Denver and San Francisco may be obtained without charge from F. C. C. Lynch, director, Natural Resources Intelligence Service, Ottawa, Canada. The maps are on a liberal scale, colored and folded.

STATE HIGHWAY MANUALS, either in printed or mimeographed form, are now common. The Ohio department of highways (Columbus, Ohio) has published a revision of its Manual of 1927, as an illustrated bound volume of 253 pp. The main divisions are Plans and Surveys, Inspection, Sampling and Testing Materials and an appendix containing a glossary, tables, formulas and diagrams. The staff given credit for the compilation is headed by H. H. Wyss, assistant chief engineer, bureau of construction.

PORT IMPROVEMENTS at Bilbao, Spain, completed, in progress and projected, are described in the 1929 report of Lewis Camina, engineering director, Bilbao Harbor Commission. New wharves, warehouses, wharf equipment and breakwaters are outlined. Illustrations are given of an interesting method of constructing a long breakwater at the harbor entrance, utilizing large cubical artificial stones which were transported to the sinking site on novel barges with inclined roller bottoms from which the stones could be slid into the water.

RAINFALL MAPS OF WISCONSIN and Adjoining States, with their accompanying tables, will file nicely with the more extensive data for New England outlined in an accompanying note. The Wisconsin tables give monthly averages for the years from 1897 to 1928 in Wisconsin and adjacent states grouped geographically. There is a rainfall map for each month, but these cover the whole area. The paper is by Eric R. Miller and is reprinted from *Transactions* Wisconsin Academy of Sciences, Arts and Letters, Vol. XXV, issued in May, 1930. (Address as above, Madison, Wis.)

THE WATER-WORKS OF PITTSBURGH, as described shortly before his death early this year by Erwin E. Lammpher, managing engineer, and Typhoid Fever Statistics of Pittsburgh, beginning with 1873, compiled by C. F. Drake, superintendent of water filtration, make up a 45-p. octavo pamphlet (Bureau of Water, Pittsburgh, Pa.). Mr. Lammpher outlines the works, historically and physically. Among several tables presented by Mr. Drake is one showing typhoid deaths by months from 1873 to 1928, with the totals and the rate per 100,000 for each year. The rate begins with 143.6 in 1873 and ends at 1.8 in 1927 and 3.3 in 1928.

FOR THE BENEFIT of those who make the proposed nine-day excursion trip to the city of Mexico after the annual convention of the American Public Health Association at Fort Worth, Tex., Oct. 27 to 30, a paper on The Water-Works of the City of Mexico has been written by Eduardo Melina and other engineers of the water-works named, and is now available as a reprint from the Southwest Water Works Journal, June, 1930. (For copies, address V. M. Ehlers, director bureau of sanitary engineering, State Board of Health, Austin, Tex.) Brief descriptions of the early supplies—Aztec and Spanish—are followed by details of the present works, built from 1905 to 1913.

CONCRETE CONSTRUCTION IN THE NAVY, as practiced by the U. S. Bureau of Yards and Docks, is covered by two recently issued pamphlets, 13Ya and 13Ya appendix 1. The first gives specifications for all kinds of concrete work except pavement. The second is on design details, use of various types of aggregate, admixtures, high working stresses, slumps, the use of a "job curve," suggestions for the use of ready-mixed concrete and of high-early-strength concrete, vibration and tamping of concrete, deposition of concrete under water, floor finishes, surface waterproofing, etc. Although not specifically stated, these two documents are supplementary to the Navy Department's "Standards of Design for Concrete," No. 3Yb, prepared by Lieut.-Commander Ben Moreell and issued in November, 1929.

RAINFALL IN NEW ENGAND and adjacent territory, by far the most comprehensive body of rainfall statistics for a single section of the country ever published, fills 195 pp. of the *Journal* of the New England Water Works Association for June ($1.25, New England Water Works Association, Tremont Temple, Boston, Mass.). The figures were compiled by X. H. Goodenough, chief engineer, Massachusetts State Board of Health, and as they now stand bring to 1928 data first presented by the author in 1915 and supplemented in 1921 and 1926. Four of the many score of station records included cover more than 100 years and a number of others more than 75 years. For each station the monthly and annual figures are given, and also the corresponding averages for the period embraced. Station elevations are also given. (See also accompanying note on Wisconsin rainfall maps.)

New Books and Revised Editions

[*Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.*]

THE AERONAUTICS BRANCH DEPARTMENT OF COMMERCE: Its History, Activities and Organization—By Laurence F. Schmeckebier. Washington: The Brookings Institution. Cloth; 6x9 in.; pp. 147; tables. $1.50.

BLACKSMITH'S MANUAL ILLUSTRATED: A Practical Treatise on Modern Methods of Production for Blacksmiths, Apprentice Blacksmiths, Engineers and Others—By J. W. Lillico, Practical Blacksmith and ex-Foreman (Scotswood Works of Sir W. G. Armstrong Whitworth & Co., Ltd.). London: Crosby Lockwood & Son, Stationers' Hall Court, Ludgate Hill, E. C. Cloth; 6x10 in.; pp. 211; illustrated. 9s.

COST FINDING FOR ENGINEERS—By Charles Reitell, Ph.D., Professor of Accounting, University of Pittsburgh, Consultant of Standard Costs; and Clarence Van Sickle, M.A., Assistant Professor of Accounting, University of Pittsburgh, Associated with Sheppard & Co., C.P.A. New York and London: McGraw-Hill Book Co., Inc. Cloth; 6x9 in.; pp. 518; many tables. $5.

EXZENTRISCH BEANSPRUCHTE SÄULEN VERSUCHE MIT STAHLSÄULEN QUERSCHNITTSBEMESSUNG—With Summaries in English and French—Von A. Ostenfeld, Laboratorium für Baustatik der Technischen Hochschule, Copenhagen. Copenhagen: Danmarks Naturvidenskabelige Samfund. Paper; 7x10 in.; pp. 61; tables and text illustrations. 3 krone.

Describes more than 100 tests of eccentrically loaded steel columns of round, square, channel and I-section, with eccentricity ratios varying from 1 to 6 and *l/r* values from 50 to 150. Several sets of formulas for maximum stress waves were determined, based on strict proportionality between stress and strain and on proportionality only up to the yield point and above that limit a constant stress. As these formulas, although satisfactory, are cumbersome, the report presents and explains the use of related empirical formulas of simple parabola or fourth degree parabola type which give an easy and practical method of determining dimensions of columns under eccentric loads.

FACTS AND FIGURES ABOUT STRUCTURAL STEEL—Second Edition. American Institute of Steel Construction, Inc., 200 Madison Ave., New York City. Paper; 5x8 in.; pp. 126.

Gives many interesting facts and statistics of the structural steel industry in interesting and usable form. Lists the various services offered by the American Institute of Steel Construction, such as educational meetings, lantern slides, publications and books, and gives height, area, volume and other dimensions of notable buildings, bridges and other structures. Closes with a 50-p. glossary.

DIE FINANZIERUNG DES DEUTSCHEN STRASSENBAUES: Denkschrift der Studiengesellschaft für die Finanzierung des deutschen Strassenbaues. Address organization just named, Berlin W 8, Germany. Paper; 8x10½ in.; pp. 115; tables, line cuts and folding maps. 8 RM.

LIFE EXPECTANCY OF PHYSICAL PROPERTY, Based on Mortality Laws—By Edwin B. Kutz, E.E., Fellow, A.I.E.E., Head Department of Electrical Engineering, State University of Iowa. New York: The Ronald Press Co. Cloth; 6x9 in.; pp. 205; tables and 90 diagrams in text. $6.

MODERN BRIDGE CONSTRUCTION: A Treatise Setting Forth the Elements of Bridge Design and Illustrating Modern Methods of Construction—By F. Johnstone Taylor, Author of "Water Power Practice," "River Engineering," etc. London: Crosby Lockwood & Son. Cloth; 6x9 in.; pp. 235; halftones, line cuts and tables.

PERSONENKRAFTWAGEN KRAFTOMNIBUS UND LASTKRAFTWAGEN IN DEN VEREINIGTEN STAATEN VON AMERIKA: Mit besonderer Berücksichtigung ihrer Beziehungen zu Eisenbahn und Landstrasse—Von Dr. rer. pol. Emil Merkert, Diplom-Kaufmann, Feuerbach-Stuttgart. Berlin: Julius Springer. 6½x10 in.; pp. 356 plus 8 pp. halftones; tables and line cuts in text. Paper, 28.5, bound 29.5 RM.

PIPING HANDBOOK—By J. H. Walker, M.Am.Soc.M.E., M.Am. Soc. Heating and Ventilating Eng., Superintendent of Central Heating, The Detroit Edison Co., and Sabin Crocker, M.Am.Soc. M.E., M.A.S.A. Sectional Committee on Standardization of Pipe Flanges and Fittings, Engineer, The Detroit Edison Co., with contributions by others. New York and London: McGraw-Hill Book Co., Inc. Flexible; 5x7 in.; pp. 763; tables and text illustrations. $5.

PRINCIPLES OF ENGINEERING ECONOMY—By Eugene Grant, A.M., C.E., Assoc. M.Am.Soc.C.E., Professor of Industrial Engineering, Montana State College. New York: The Ronald Press Co. Cloth; 6x9 in.; pp. 387. $3.75.

STATIK—Von Dr. Ing. Ferd. Schleicher, Privatdozent an der Technischen Hochschule Karlsruhe. I. Teil Die Grundlagen der Statik starrer Körper. Berlin and Leipzig: Walter de Gruyter & Co. Cloth; 4x6 in.; pp. 141; 47 line cuts. 1.8 marks.

WEHRE UND SOHLENABSTÜRZE. Berechnung der Unterwasserspiegellage und Kolktiefe bei den verschiedenen Abflusskarten. Untersuchungen aus dem Flussbaulaboratorium der Technischen Hochschule zu Karlsruhe—Von Dr.-Ing. Josef Einwachter. Munchen und Berlin: R. Oldenbourg. Paper; 8x11 in.; pp. 58; line cuts and halftones. 8 marks.

Theoretical discussion of the hydraulic jump and alternates stages of flow. Give experimental data on transition from low stage to high stage at the foot of a spillway and discusses forces in operation causing turbulence. The action of these forces in causing scour and the results of the use of auxiliary structures to prevent the scouring effect ore presented.

Letters to the Editor

Wear on Ohio City's Concrete Pavements

Sir—In the Jan. 7, 1904, issue of *Engineering News* you published a letter from me giving some information about several concrete street pavements in Bellefontaine, Ohio. Pictures of these streets were published at that time.

I am sending you some pictures taken of these same streets on July 6, 1929, 25½ years later. A comparison of the two sets of pictures will give some idea of how concrete has served this city.

Fig. 2 is of Columbus St. in front of the court house, one of the two heaviest traveled streets in Bellefontaine.

In order to prevent slipperiness the concrete blocks were rolled with an imprint roller, leaving pyramidal indentations into the slag about ¾ in. deep. Fig. 1 shows these indentations at the side of the street where traffic has not been sufficient to wear the surface down to imprint depth. In the center of the street these impressions have been worn off. Very little repair work has been required.

These two streets were constructed in 1893 by W. T. Snyder, contractor. They cost, including filling, drains and curbs, $2.15 per square yard.

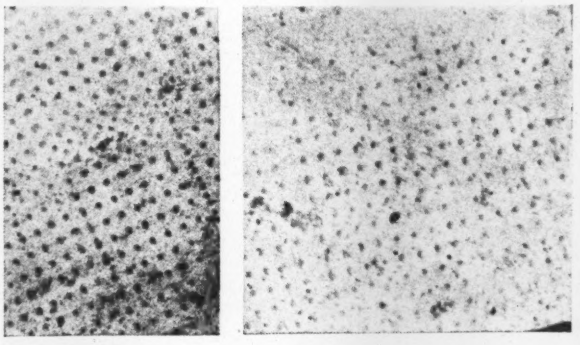


FIG. 1—DETAIL OF SURFACE, COLUMBUS ST., BELLEFONTAINE, OHIO

Picture at left taken in 1921; the one at right in 1929. Both show surface at side of the street, where traffic has given the pavement less wear than in the middle of the street.

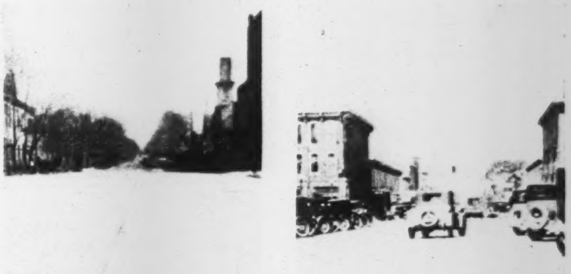


FIG. 2—COLUMBUS STREET IN BELLEFONTAINE, OHIO

Pavement laid in 1893. Pictures at left taken in 1904; the one at right in 1929.

The population of Bellefontaine has been as follows, according to the U. S. census: 1900, 6,650; 1910, 8,238; 1920, 9,336.

F. H. Eno,
Research Professor, Highway
Engineering, Ohio State University.

Columbus, Ohio,
April 16, 1930.

Laying High-Pressure Gas Line

Sir—In the issue of *Engineering News-Record* for May 15, 1930, there appears an article by H. C. Sandbeck regarding the laying of 6,520 ft. of 8-in. pipe on the bed of the Hudson River from Beacon to Newburgh. I cannot refrain from expressing my appreciation of this article, not only for the clear and concise language in which its author has described the work but also for the mathematical treatment of the subject. Too often operations of this sort are intrusted to "practical" men, who not only lack fundamental engineering training but scorn methods of attacking problems through mathematical or scientific means.

It is to be hoped that this article will be noticed not only by engineers but also by a certain class of executives and that it will cause the latter to appreciate that "figuring fools" can effect economies on obscure work as well as on 3,500-ft. span bridges and 9,000-ft. subaqueous tunnels.

Charles Jay Seibert,
Chief Civil Engineer, Rio de
Janeiro Tramway Light & Power Co.

Rio de Janeiro, Brazil,
June 23, 1930.

News of the Week

Tennessee Bridge Span Falls During Construction

One 366-ft. span of a steel highway bridge being built over the Tennessee River at Trotter's Landing, Tenn., dropped into the river on July 9. T. C. McEwen, state highway engineer, is authority for the statement that the entire bottom chord, as well as the most of the floor system, had been placed and riveted up when the falsework supporting the steel collapsed. The resident engineer on the job is of the opinion that the piling supporting the falsework did not have sufficient bearing power and settled out. The falsework itself, above the piles, was of ample strength. No injuries resulted from the accident, and it is believed that much of the material will be salvaged. The steel contract had been sublet to the International Steel Co., Evansville, Ind., by the Hardaway Construction Co., Columbus, Ga.

Chicago Water Diversion in Accordance With Court Order

The Chief of Engineers has officially declared null and void the permit granted the Sanitary District of Chicago on Dec. 31, 1929, to divert water from Lake Michigan and has decreed that on the effective date of the decision of the U. S. supreme court water shall be diverted only in accordance with the court's decision.

Contract Relet for Completion of Cobble Mountain Dam

Work on the Cobble Mountain dam and reservoir, being built to augment the water supply of Springfield, Mass., which was stopped owing to the inability of the contractor, Winston & Co., Inc., to complete the job, will shortly be recommended. Bids for completion of the contract were re-advertised and the contract was let on July 11 to the S. J. Groves & Sons Co. The price for the completion of the work is $960,000, substantially the same as that of the original contract.

Arkansas City Sells Municipal Water-Works

The city water-works of Walnut Ridge, Ark., has been sold by the city council to the Associated Utilities, Inc., a subsidiary of the Municipal Telephone & Utilities Co., of Kansas City, for approximately $46,000, which was the value of the plant as appraised last year by engineers. The company is expected to assume management of the water plant in about 60 days.

Canada Suggests Plan for Development of St. Lawrence River

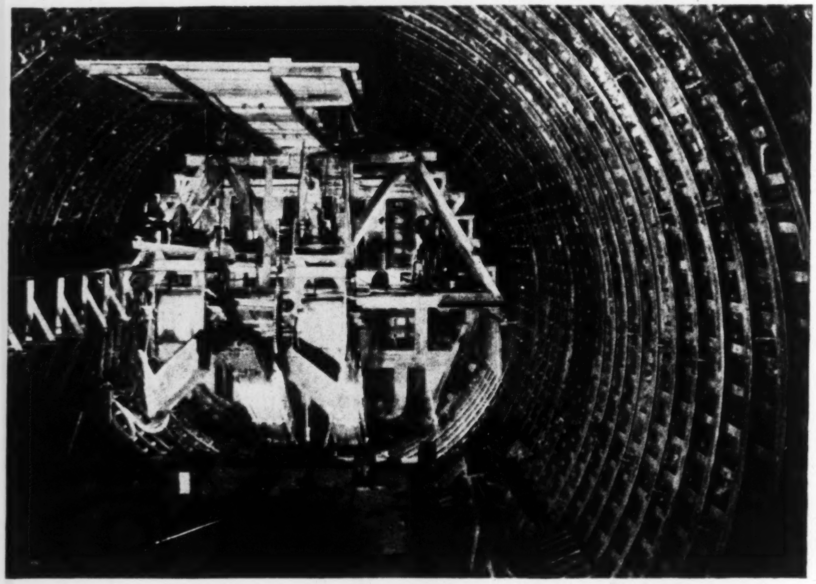
Two-Stage Construction Proposed for International Rapids—Joint Board to Meet Again

DEVELOPMENT of the 48-mile international rapids section of the St. Lawrence River in two stages is favored in a report recently submitted by a conference between members of the Canadian section of the International joint board of engineers and representatives of the Ontario Hydroelectric Power Commission. The conference was called with a view to examining the engineering difficulties involved in the deepening of the St. Lawrence for navigation and its development for power. The new plan differs in certain respects from a two-stage scheme suggested by Canada in the conference with the United States held several years ago, at which representatives of the United States favored single-stage development. It definitely recommends the installation of a lower development at Crysler Island, about 3 miles below Morrisburg, Ont., and another at Barnhart Island, 2½ miles above Cornwall, Ont. The navigation canal at Crysler Island could be placed on either side of the river at approximately the same cost; at Barnhart Island, however, the canal could be constructed more economically on the United States side. Transfer of this latter canal to Canadian territory would result in an increase in cost of from $5,000,000 to $8,000,000. Recommended power installation at Crysler Island is 592,000 hp.; at Barnhart Island 1,607,000 hp. The report estimates the total cost of the project at $274,000,000 for the cheapest installation.

Dispatches reaching Washington indicate that a resumption of Canadian-American negotiations on the St. Lawrence seaway and power project will probably take place soon after the July elections in Canada. Another meeting of the joint board of engineers representing the two countries will probably be held to consider the two-stage plan. Should this be approved, the next step will be the negotiation of a treaty between the two countries to share the expense of the work.

Approach Shield Meets Tubes on Detroit Vehicular Tunnel

Early in the morning on June 26 the last shove was made on the shield driving the Windsor approach to the Detroit-Canada vehicular tunnel, the shield meeting the bulkhead in the subaqueous tube section nearest the Canadian shore of the Detroit River. This completes excavation work on the tunnel. As described in *Engineering News-Record*, Oct. 17, 1929, p. 600, the tunnel consists of nine tubes 248 ft. long sunk by the trench method, with a shield-



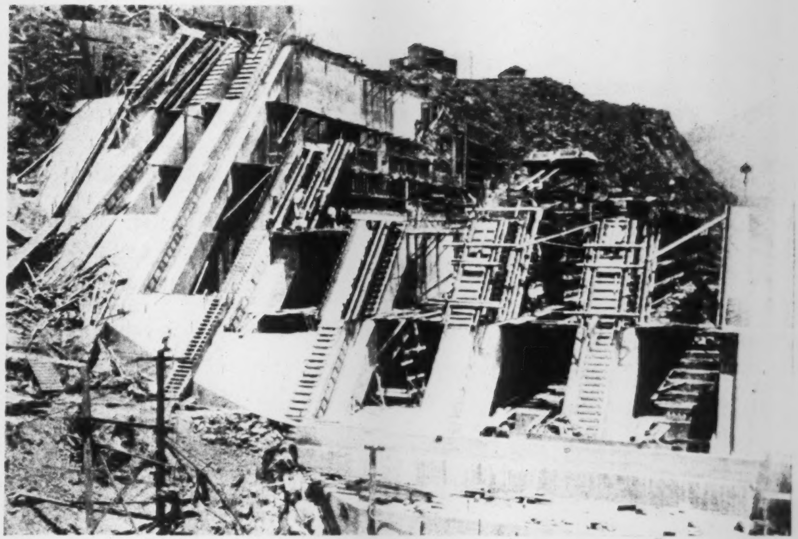
REAR VIEW OF 32-FT. SHIELD DRIVING WINDSOR APPROACH ON DETROIT-CANADA VEHICULAR TUNNEL

Note conveyors on rear of shield, which load muck direct into cars. Lining consists of pressed-steel plates reinforced by I-beam struts.

driven approach section on each end running into short open-cut sections at the extreme ends. The tunnel will carry a double-lane roadway 22 ft. wide. The shield, 32 ft. in diameter, was used first on the Detroit side and then dismantled and removed to the Windsor side. A maximum of 22 lb. of air was used.

A feature of the shield-driven sections was the use of pressed-steel liner plates instead of the conventional cast-iron lining. The liner plates are 9 in. deep, 30 in. wide and about 9 ft. long, eleven full sections and a key section being required to complete one ring. The plates are reinforced with I-beam struts and withstood the thrust of the shield without trouble. Concrete lining on the Detroit approach has been completed, and will commence soon on the Windsor approach.

All of the nine river section tubes have been sunk and joined together. Pouring the sidewalls and roof of the tubes is in progress on seven of them, tube 8 has just been tapped from the inside and the bulkheads between tubes 7 and 8 removed. Tube 9, nearest the Canadian shore, has not yet been entered from the inside. The ventilation buildings are nearing completion and the fan equipment is being installed. Lining the tunnel with white tile has commenced on the extreme end sections. It is expected that the tunnel will be completed and in operation before the first of next year.



BUTTRESS CONSTRUCTION AT RODRIGUEZ DAM

Construction is well advanced on the Rodriguez dam, being built near Tijuana, Mexico, to provide storage for an irrigation project of the government. With a height of 187 ft. above streambed, this structure is the highest dam of the Ambursen type ever constructed. The crest length will approach 2,200 ft.; the storage capacity will be 110,000 acre-ft. Unusual foundation construction and a cutoff which may extend to 300 ft. below streambed are special features required by faults in the rock.

No Jobs Open at Present on Boulder Dam

Employment on the Boulder dam project will develop only as contracts are let, and ample notice will be given when opportunities for work present themselves, it is announced by Secretary of the Interior Wilbur. Despite notice that there are no positions to be filled at present, applications have been flooding the office of the Bureau of Reclamation at the rate of nearly 200 a day.

When Secretary Wilbur announced the beginning of construction, he made the following statement: "Of one thing the public should be warned, and that is the unwisdom of going to the vicinity of the dam site in the expectation of getting work without ample provision to meet the emergency should this expectation fail. The dam site is located in the midst of a great desert with few inhabitants and slight opportunity for other employment than that which it may afford."

Headquarters Opened in Denver

The entire third floor of the Temple Court Building in Denver has been leased to provide office space for the Boulder dam engineering corps during its expected eight years' headquarters in that city. About 40 additional engineers will shortly join the existing staff, according to Elwood Mead, U. S. Commissioner of Reclamation, who was recently in Denver for a conference with Raymond F. Walter, chief engineer for the Denver district.

Engineers Receive Prize Awards at Am.Soc.C.E. Meeting

For outstanding achievement five engineers received awards at the opening session of the 60th annual convention of the American Society of Civil Engineers in Cleveland last week.

A gold bronze medal, the first prize in the annual Phebe Hobson Fowler professional award, was bestowed upon Arthur W. Berresford, of New York, "in recognition of his particularly efficient administration of the American Engineering Council during the two years of his incumbency as its president." Second prize, a silver bronze medal, went to J. Vipond Davies, of New York, "in recognition of his accomplishment as chairman of a committee of the American Society of Civil Engineers which developed the report on charges and method of making charges for professional services, adopted by the society."

Three engineers received prizes in the Phebe Hobson Fowler architectural award as follows: first, Morris Goodkind, of New Brunswick, N. J., for the design of the Raritan River bridge at New Brunswick; second, Prof. Charles M. Spofford, Massachusetts Institute of Technology, for the design of the Lake Champlain bridge; third, George F. Burch, of Springfield, Ill., bridge engineer of the Illinois division of highways, for the design of the Dixon Springs bridge, Dixon Springs, Ill.

The awards were established by Charles Evan Fowler, consulting engineer, New York, in honor of his mother.

Many Drowned as Trolley Runs Off Open Bridge in Brazil

Only three passengers are reported to have escaped from a loaded trolley car which on July 12 ran off the level approach to a raised bascule bridge over the Riacho River at Buenos Aires, Argentina, during a heavy fog. All other passengers and the motorman were caught within the car and drowned. A total of 53 bodies were recovered from the stream within a short time after the accident.

Court Cuts Award in Mississippi Levee Condemnation Case

Federal Judge Faris has upheld the government's contention that condemnation commissioners had made excessive awards for land taken for the setback levee rights-of-way in southeast Missouri, and in one case has reduced the amount of the award approximately 40 per cent. His opinion was given in the case of the Francis-Ralph Realty Co., from whose tract of 2,060 acres in Mississippi County, Mo., army engineers are taking 193 acres for the right-of-way for the levee under construction between Bird's Point and New Madrid in accordance with the national flood-control act.

The commissioners awarded the company compensation and damages totaling $59,477, but that figure was cut by the court to $35,568. The amount awarded is practically the same as that which the government offered before the trial was begun.

Drought Becoming Serious in the Southeast

Deficient rainfall in recent months in the Southeast is beginning to be felt by hydro-electric operations and municipal water supplies in that section. The lack of precipitation since the first of the year ranges from 9 to 14 in. below the average. Long periods of steady dry winds have served further to reduce the superficial moisture. Added to these conditions is the fact that the deep groundwater reserves have never been built up since the great drought of 1925.

The total annual rainfall in the last three years has, it is true, been near the average. Much of this has come, however, in the way of very heavy storms over short periods. Notable among these were the floods of August, 1928, and September and October, 1929. But long periods of steady rain common to large areas of the Southeast have not occurred to any extent for six years. Hence the depletion of the groundwater reserves.

Hydro-electric developments have only just begun to be affected seriously by the present low runoff of the streams of the Southeast. Storage reservoirs were filled unusually early this year by a few heavy storms. As soon as the rainfall dropped below normal, however, the streams began at once to show the lack of groundwater storage. As a result most of the reservoirs have been drawn down very fast. Streams throughout the mountain sections of east Tennessee, the Carolinas and Georgia are down to or below the stages reached in the 1925 drought. Unless rain comes soon the situation will rapidly become bad, although slack industrial demand for power will probably avoid a crisis. Steam plant reserves largely provided since the 1925 drought also are ample to meet most present requirements.

Municipalities in the Southeast depending on day-to-day streamflows for their water supply are already in a tight place in many cases. The 1925 drought aroused numerous cities and towns to augment their water resources. Such places have not yet felt the pinch, but others that were not so provident, thinking the 1925 low water would probably not occur again in a long time, are faced with bad shortages. This also applies to industries having their own inadequate sources of supply.

First Legal Step Toward Water Filtration in Chicago

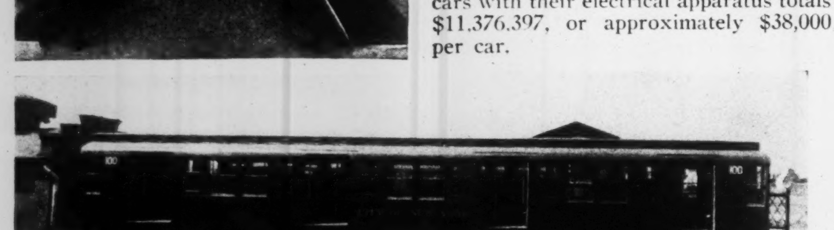
As curtailment of water waste is the first step toward filtration of the water supply of Chicago a sub-committee of the city council on June 19 requested the draft of ordinances eliminating the present exemption of one- and two-family houses from being metered; eliminating the present 15 per cent discount on water bills; establishing the water rate on the basis of total expenditures and total pumpage of the previous year; setting a standard meter specification, and providing for cost of meters and installation by sale of water certificates.

New Steel Cars for New York Eighth Ave. Subway System

The first consignment of the 300 steel cars for New York City's new Eighth Ave. subway system are expected to be delivered during the last week of July. They are being constructed at the shops of the American Car & Foundry Co. at Berwick, Pa.

The cars will have several features new in the construction of rapid-transit rolling stock. Four pairs of doors on each side of the car, allowing ingress and egress in eight files, will reduce the time required for loading and unloading passengers. A new safety mechanism is a door pin or bolt that drops and locks the doors shut before the starting light shows in the motorman's cab.

The new cars will seat 60 persons and there is standing room for 220 more, making the gross capacity 280 passengers. The cars weigh 42 tons each and the combined contracts for the 300 cars with their electrical apparatus totals $11,376,397, or approximately $38,000 per car.



INTERIOR AND EXTERIOR VIEWS OF NEW YORK'S NEW SUBWAY CARS

Bids Opened for Approach to Hudson River Bridge

Bids for the construction of the Manhattan approach to the Hudson River bridge were opened by the Port of New York Authority on July 14. Two separate contracts are involved. One provides for the building of a vehicular tunnel 2,000 ft. long in West 178th St., extending from Fort Washington Ave. to Amsterdam Ave., and also including among other things the excavation work between Pinehurst Ave. and Fort Washington Ave. leading to the tunnel. The other contract covers the building of a ramp about 980 ft. long, extending eastward from the approach anchorage in Fort Washington Park and consisting of a 196-ft. reinforced-concrete arch, a structural steel and reinforced-concrete structure about 500 ft. long and an open cut of 200 ft.

Nine bids were received for each contract. The low bid in each case was presented by the Cornell Contracting Corp., New York, $1,153,210 for the tunnel and $746,679 for the ramp. The high bid for the tunnel was $2,894,547 and for the ramp $1,766,945.

Philadelphia to Extend Subway System

Legislation authorizing transit projects expected to cost about $40,000,000 was passed by the Philadelphia city council at its meeting on July 2. One bill authorizes the extension of the Market St. subway under the Schuylkill River from 20th St. to 46th St. and the removal of the present bridge and elevated railways between these points. Another bill authorizes the appropriation of $10,000,000 toward the construction of a high-speed subway under Locust St. connecting with the Ridge Ave. branch of the Broad St. subway at 8th St.

Curb Parking in San Francisco Nearing the End

Each business day more than 100,000 vehicles enter the San Francisco central traffic district. All available parking space is utilized to more than 90 per cent of its capacity from 9:10 a.m. to 5:10 at night. If all loading zones (three minutes for passenger cars and twenty minutes for trucks) were removed, only 30,280 of these 100,000 vehicles could find a place to stop at the curb, but the loading zones will serve about 50,000 vehicles if used to capacity. These are the figures for February, 1930. In the corresponding month of 1928 (noted in *Engineering News Record*, Oct. 11, 1928, p. 536) 81,000 vehicles entered the district, and as then determined 32,000 cars could be parked if loading-zone restrictions were lifted. More than ever, it is noted in a recent report on curb parking to M. M. O'Shaugnessy, city engineer, by George D. Burr, traffic engineer, the time is not remote when curb space cannot remain open at all in the central district for storage of standing vehicles.

Certain minor changes have been made during the two years in the various curb restrictions mentioned in our former article. Red curb (no stopping) has been decreased slightly, since red clearance zones at corners are decreased from 20 ft. to 15 and 10 ft. and several mid-block crosswalks have been removed. Some increases have taken place due to additional button-type safety zones. Revision of the state motor vehicle law now permits parking within 10 ft. of hydrants instead of 15 ft. Taxi stands have been increased from 2.8 per cent of curb space to 3.2 per cent.

Garage facilities are lacking. Much cruising is the result; because it is seriously objectionable, the establishment of cab garage stands is predicted as a necessity at an early date.

Garages have storage for 4,810 vehicles, which is 2½ times the total available 40-minute curb parking space. Undeveloped lot storage is negligible. Therefore Mr. Burr concludes that to increase automobile loading and storage capacity of the district garages must be erected.

Field Office in Panama to Aid Inter-Continental Highway

To co-operate with the governments of the Central American countries in making preliminary surveys to determine the most desirable route for an inter-American highway, the U. S. Bureau of Public Roads is opening a field office in Panama City, in charge of E. W. James, chief of the division of highway transport of the bureau. Congress has appropriated $50,000 for this work.

Plans for Enlargement of Bolling Field

One of the outstanding features of the development of aviation in the army is the program for the enlargement of Bolling Field, District of Columbia, which was authorized by Congress and for which an appropriation of $666,000 became available on July 1. This amount was to provide for the acquisition of the necessary additional land. Already a 345-acre tract of land immediately south of the field has been purchased and the remainder of the acreage desired will be acquired.

As soon as the necessary land has been acquired, steps will be taken by the quartermaster-general to proceed with plans for the erection of buildings in conformity with projects already authorized by Congress and extending over the fiscal years of 1930, 1931 and 1932. Already funds are available for barracks at an estimated cost of $240,000; an administration building, estimated cost $42,000; and a warehouse to cost approximately $38,000. Other buildings will be erected during 1931 and 1932 as appropriations are available.

New Belgian Canal Started, to Link Liége and Antwerp

On June 1 the king of the Belgians started the electric excavator which began the digging for the construction of a new canal which will link Liége and Antwerp. The work, which it is estimated will cost more than $55,000,000, is expected to take six years. The king spoke of the economic importance of the canal for the prosperity of Antwerp and the development of the Liége industrial area.

The Business Outlook

Certain important indicators of the business situation have exhibited surprising strength this week. This is partly circumstantial, but the trend toward recovery has become more clearly evident. Basic industrial activity, farthest removed from ultimate consumption, continues slack. This is partly seasonal and partly due to the fact that these basic industries respond slowly to recovery. Building, however, has shown remarkable strength in recent weeks and general trade continues at a relatively high level for the season. Commodity prices during the past week have shown definite resistance to further decline.

The Business Week, July 16.

Railways to Use St. Louis Municipal Bridge

After several years of controversy between the city and the railroads as to the use of the tracks on the Municipal bridge, completed in 1917, an agreement has been made by which the Terminal Railroad Association will abandon the use of the Eads bridge and transfer its traffic to the Municipal bridge. Before all traffic is handled in this way, however, additional approaches will be necessary to connect the bridge with all of the numerous railways on the east side of the river. A summary of the history of the Municipal bridge was given in *Engineering News-Record* of Oct. 24, 1929, p. 649.

Agreement Reached on Verde River Irrigation Project

An agreement has been reached between Secretary of the Interior Wilbur and the Verde Irrigation and Power District of Arizona, making possible, so far as the government is concerned, the immediate development of the Verde River project. This enterprise is a private undertaking and is of interest to the government primarily because there are Indian reservations adjacent to it and in addition irrigation canals, when laid down, must pass over government land.

The project contemplates a series of three dams on the Verde River in Arizona, which will store the floodwaters of that stream and develop canals that will lead the waters to Paradise and Deer valleys, where there is a large acreage admirably suited for irrigation. This area is immediately to the north of Salt River Valley, which was reclaimed by the Roosevelt reservoir.

Under the agreement the irrigation district agrees to furnish the Indians on the Salt River and Camp McDowell reservations sufficient water to irrigate 6,310 acres of land in addition to what is already being watered there. The Indians will pay for this water at a fixed price per acre-foot based on the contemplated cost of water to the district. The agreement is for 30 years, after which time a price adjustment is to be made.

Class Reunion Has 100 Per Cent Attendance After 45 Years

The first class to graduate from Rose Polytechnic Institute, at Terre Haute, Ind., was the class of 1885. It consisted of three men, all of whom took the mechanical engineering course. All three are in active business life and all attended a class reunion at the recent commencement in Terre Haute. They are Samuel S. Early, assistant to the president, Ames Shovel & Tool Co., Boston, Mass.; Ozni P. Hood, chief mechanical engineer, U. S. Bureau of Mines, Washington, D. C.; and Benjamin McKeen, vice-president, Pennsylvania Railroad, St. Louis, Mo.

The class of 1880 of the Massachusetts Institute of Technology—the 50-year class—assembled six of its sixteen living members at the recent commencement. One of the six was Henry D. Winton, who for more than 40 years has been associated with the Hersey Manufacturing Co. at Boston and at present is its secretary.

Experiments With Road Surfacing in Maryland

An interesting road experiment has just been launched by the Maryland state roads commission, using a section of the Annapolis Boulevard between Baltimore and Annapolis. The commission has used fourteen kinds of surfacing on the road, each section being more than 1,500 ft. long. The old concrete road, in use for a number of years, was used as a base for the new types of road. Two concrete shoulders, each 2 ft. wide, were added to the road, leaving the original 16-ft. roadbed as the base for the experimental materials. Work on the fourteen sections was completed recently and the road thrown open to motorists. It is a heavily traveled thoroughfare, especially in the summer, and a close watch is being kept on each section.

Paonia, Colo., to Dispose of Municipal Power Plant

The municipally owned power plant and distribution system of Paonia, Colo., has been sold to the Oliver Power Co. for $40,000, following an election in which proponents of private ownership won by a margin of five votes. The new owner, which operates the Oliver Coal Co., near Paonia, plans a modern generating plant at the coal mine to cost about $300,000. It is designed to supply the three municipalities of Somerset, Hotchkiss and Paonia with electricity, in addition to furnishing current for mining purposes. Under the terms of purchase the Paonia plant will not be turned over to the Oliver company for one year.

England's Sea Defense Wall at Fleetwood Completed

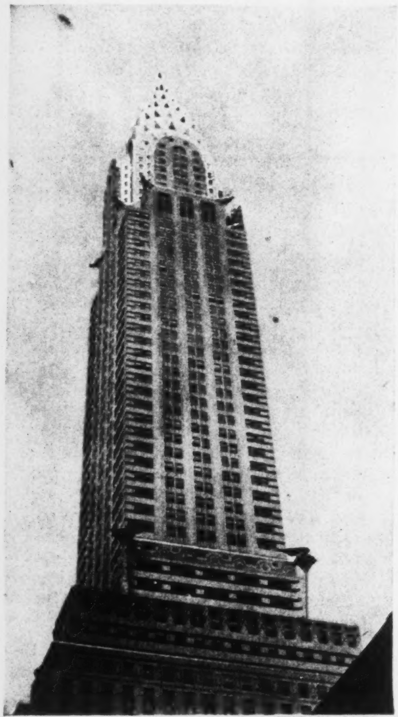
The completion of the sea defense wall at Fleetwood, England, was recently commemorated by the unveiling of a tablet by Lord Derby. This wall, which cost $275,000, was built to protect Fleetwood from the disastrous floods which formerly threatened it every time the tide was exceptionally high. The last high water, in 1927, created much havoc. Since 1847 the town has been overrun by the sea eleven times. The new wall is 1,900 yd. long, and between 13 and 17 ft. wide. It was designed to resist a tide of 38 ft., which is 8 ft. higher than any yet measured. A promenade runs along the top of the wall.

Progress on Albany's New Water-Supply System

A contract was awarded last week by the Albany board of water supply for laying 1½ miles of waterbound macadam in the town of Coeymans to the Kent Construction Co., Albany, for $87,791, the low bidder. This work was necessary on account of the relocation of the road in connection with Albany's new water-supply system.

Work on this project has been under way for more than two years and its utilization by the city is dependent upon the speed with which the filtration plant at Selkirk is completed. A new source of water supply in the Helderberg Mountains has been tapped. It is expected that the new water supply will care for the needs of Albany for the next 50 years.

At present the status of the several projects included in the work is as follows: Alcove reservoir, completed and now being cleaned up; Basic dam and Basic tunnel, completed; filtration plant at Selkirk, 25 per cent done; Loudonville reservoir, 10 per cent completed; pipe-laying contract to bring water from reservoir to city, 75 per cent done; pipe-laying contracts in city, 50 per cent completed; improvements to distributing system, contracts to be let; two macadam highways which had to be relocated, now being rebuilt and nearing completion; raising road over Basic Creek, to be advertised and contracts let later. It is expected that the entire system will be completed early in 1931.



Wide World Photo

NEW YORK'S LATEST SKYSCRAPER

Unusual view of the tower of the Chrysler Building, in New York City, as seen from the Chanin Building

Public Building Program in Baltimore

The city of Baltimore will award contracts in the next few weeks for new construction work to cost more than $2,000,000. The largest of these projects will be a water conduit to connect Druid Lake with the Montebello waterworks. The tunnel will be 9 ft. in diameter and the work will cost about $1,000,000.

A nurses' home at the Baltimore city hospitals will cost about $500,000. This will be the first unit in a program which calls for an expenditure of about $2,500,000.

Contract for a viaduct on 29th St. connecting with Mount Royal Drive also will be awarded. It will cost about $500,000 and will be the first project in connection with the city's plan to extend Howard St. The thoroughfare will be a direct feeder to Howard St.

A new pumping station at Lake Ashburton, contract for which is to be let in the near future, will cost about $150,000.

South Carolina Contracts for $2,000,000 of Cement

Cement purchase contracts for approximately 2,000,000 bbl., costing around $5,000,000, are announced by the South Carolina highway department and its chief engineer, Charles H. Moorefield. Officials of the department estimate that the average net cost of cement delivered at the various points over the state will be between $2.25 and $2.40 per barrel, depending on the quantities actually delivered at the different jobs. This cement is to be used in carrying out South Carolina's $65,000,000 bond project for a completed system of hard-surfaced highways for the state.

Bids on highway construction projects to cost approximately 5¼ million dollars will be received at the state highway department on July 25. These contracts involve the paving of 163.88 miles of highways, surface treatment for 56.39 miles, grading and in some cases sand claying 63.82 additional miles, and will include fifteen bridge projects. When these contracts are let, the total expenditure for highways in South Carolina during the past three months will be brought to the $16,000,000 mark.

Dam and Hydro-Electric Plant for Canal Zone

The U. S. Reclamation Service will soon complete plans for the Malden dam and hydro-electric power plant, a $12,000,000 project, on the Chagres River in the Panama Canal Zone. E. S. Randolph, chief designing engineer of the Reclamation Service, says that the dam has become necessary to con[illegible] the floods in the river. The power will supplant the hydro-electric facilities already in service for the Canal Zone. Work on the project will be started this year and will require four years to complete. The construction work will be supervised from the engineering offices of the Reclamation Service at Balboa Heights.

To Study Michigan Traffic as Guide to Road Tax Policy

In an effort to determine how much of the cost of local roads in Michigan should be paid by local taxpayers and how much should be spread over the state, the U. S. Bureau of Public Roads, in co-operation with the Michigan state highway department, is making an origin-and-destination traffic survey on all roads, local as well as main state highways, in sample townships in the 83 counties in the state. The survey will show to what extent the local roads of each local taxing jurisdiction are used by traffic originating within and without these jurisdictions, and will serve as a basis for distributing public money now being made available for highway improvement. The amount of tourist traffic in the state also will be determined.

The survey began on July 1 and will continue for one year. After this the same agencies will make special studies, for one month, in seven cities, Ann Arbor, Detroit, Flint, Grand Rapids, Jackson, Lansing and Niles, to determine the relative use of city streets by city vehicles and by vehicles owned outside the cities. These studies also will serve as a basis for taxation.

Brief News

RECONSTRUCTION of Vento Springs, which supply Havana, Cuba, with water, is contemplated, and plans for the immediate negotiation of a loan for this purpose in the United States are being prepared.

A ONE-DAY WATER SCHOOL was held at Longview, Tex., recently under the auspices of the state department of health and the East Texas Chamber of Commerce. There was a registration of 39.

THE QUINCY MEMORIAL BRIDGE over the Mississippi River at Quincy, Ill., has been open to traffic since June 13. There is a $3\frac{1}{2}$-mile detour on U. S. route 24 on the Missouri side of the river, but the gap in the main highway will be paved and ready for traffic by Aug. 1.

AN AMERICAN-GERMAN GROUP has made an offer to the Turkish government to build a bridge across the Bosporus, at a cost of approximately $8\frac{3}{4}$ million dollars. The government has appointed a commission to study the project.

AN ENGINEERING SURVEY is being made of the rubbish incineration plant at Baltimore on Philadelphia Road near Herring Run Park, under the direction of Warren Viessman, engineer of the bureau of mechanical-electrical service. Many complaints have been made of the plant, which cost $250,000, and if it is decided to abandon it, a new and larger one will be built elsewhere.

APPROVAL OF PLANS FOR A BRIDGE to be constructed across the Ohio River at Maysville, Ky., on application by the state highway commission of Kentucky, is announced by the War Department. The revised plans provide for a horizontal clearance of the channel span of 1,000 ft. and vertical clearance of 45 ft. at the center of the channel span and 40 ft. over a central distance of 894 ft.

A HIGH-LEVEL BRIDGE across the Ottawa River at Hawkesbury is now assured, as plans have been approved by the government of the provinces of Quebec and Ontario and by the dominion government. The cost, about $380,000, will be borne one-third by the Province of Quebec, one-fourth by the Province of Ontario and the remainder by the dominion government. Work on the bridge is expected to begin in the fall.

WASHINGTON NOTES

BY PAUL WOOTON
Washington Correspondent

Jadwin Refuses Power Commission Appointment—Preliminary Work on Boulder Dam Construction Pushed

AN OFFER from a construction company of a larger salary than he could afford to forego is said to be the reason behind the request of Lieut.-Gen. Edgar Jadwin that he be not assigned to a place on the new Federal Power Commission. It is understood that General Jadwin received an offer from the concern, the name of which was not revealed, while on his recent trip around the world.

Changes in Flood Control Plan

Conceding that it is necessary to make some changes in the Jadwin flood-control plan, Secretary of War Hurley stated last week that it is not the War Department's policy to advocate these changes in a piecemeal fashion. Whatever changes are made should be assembled and studied as a whole before the act is amended, he believes. He called attention to the fact that the army engineers at present are engaged in a comprehensive survey of the flood situation for the purpose of recommending changes.

It also is Secretary Hurley's belief that there should be no change in the policy of handling levee setback work. The position of the War Department on this work was announced to correct an impression that the department is willing that the federal government bear part of the cost incurred in moving back levees. The only cost borne by the federal authorities is for the construction of the new levee. It is believed that the local authorities can obtain rights-of-way more cheaply and more expeditiously than the government.

Mapping Black Canyon for Boulder Dam

Active investigations preliminary to construction at Boulder dam are being pushed by the Bureau of Reclamation now that the appropriation of $10,660,000 has been made available for this purpose. The specific items covered by these funds are described in *Engineering News-Record* of May 8.

An initial step important in the planning of diversion works, placement of construction railway spurs and the final location of the dam itself will be the topographic mapping of Black Canyon on a scale of 50 ft. to the inch and 5-ft. contour intervals. It is impossible to use ordinary ground methods with the desired accuracy and vertical air photos would not solve the problem, because the canyon is in shadow; therefore it was decided to use a phototheodolite, taking pictures from ground stations tied in by triangulation and developing the plan and contours by use of the aerocartograph stereoscopic instrument. The proposed townsite to house project employees is being surveyed by aerial methods by Brock & Weymouth, of Philadelphia.

Hydraulic Laboratory Plans Discussed

Further plans for the National Hydraulic Laboratory were discussed at the Bureau of Standards on July 14 and 15, when the special advisory committee of hydraulic engineers and federal officials held its second meeting. No final decisions were reached, since such problems as the quantity of water to be used require extensive studies before a commitment is made. It is expected that the design will be finished about next September and that contract will be let shortly thereafter.

Colorado River Hydro Projects Rejected

Applications on the Colorado River which have been rejected by the Federal Power Commission represent a total of 7,000,000 hp. Five applications were rejected outright because they are in conflict with Boulder dam. The remaining 21 applications were rejected subject to the right of appeal within 90 days.

Railroads Questioned on Bus and Truck Service

The Interstate Commerce Commission's investigation into the co-ordination of motor and rail transportation has been initiated with a questionnaire calling upon the railroads to furnish by Aug. 15 complete information concerning every phase of the extent to which they have engaged in bus and truck service. Since the commission's first investigation of motor vehicle operation, the railroads have greatly extended their motor transport operations.

Free Passenger Transfer by Pennsylvania Stopped

Without passing upon the lawfulness of free passenger transfer service either by motor coach or other means, the Interstate Commerce Commission has canceled the tariff filed by the Pennsylvania to meet Baltimore & Ohio competition by providing for free transfer from and to its New York and Newark stations of parties of 25 or more passengers. The commission's report states that the Pennsylvania's tariff is objectionable because it lacks clearness and would create undue prejudice in violation of section 3 of the interstate commerce act, inasmuch as free transfer service would be accorded to passengers between points in Manhattan, Bronx and Brooklyn without a like extension of terminal facilities into Queens and Richmond.

To Interest Engineers in Farm Construction Field

Recommendations for correlating and stimulating research in the design and construction of farm structures will be presented in a forthcoming report by the advisory council set up by Secretary of Agriculture Hyde. In announcing that preparation of the report will be completed by Sept. 15, S. H. McCrory, chief of the division of agricultural engineering, Bureau of Public Roads, stressed the need for demonstrating to student engineers the possibilities in the farm construction field.

Personal Notes

Robert Ridgway, chief engineer of the New York City board of transportation, was appointed on July 14 chief consulting engineer of the Chicago subway. The appointment is subject to confirmation by the city council and to the approval of New York transit authorities.

William A. Van Duzer, of Harrisburg, Pa., president of the American Road Builders' Association, has been designated by the state department as a representative of the United States on the permanent commission of the International Association of Road Congresses.

T. B. Jackson has been appointed vice-president and general manager of the Boise (Idaho) Water Corporation to succeed E. E. Smith, who died recently. Mr. Jackson has been employed by the water company since 1898.

Melvin D. Casler has joined the staff of the Port of New York Authority on preliminary studies in connection with the proposed 38th St. vehicular tunnel to Weehawken.

James S. Taylor, of Rochester, N. Y., who since September, 1928, has been acting chief of the division of building and housing of the U. S. Bureau of Standards, has been promoted to the position of division chief.

Theodore M. Matson, resident engineer of the San Francisco Traffic Survey Committee from July, 1926, to June, 1929, has been appointed assistant traffic engineer for the city of Philadelphia. During the past year Mr. Matson has been chief engineer of the Citywide Traffic Committee of Kansas City.

Oscar O. Kuentz, major, Corps of Engineers, has been assigned to Portland, Ore., as district engineer, and will take over the duties of the office on July 27. Lieut.-Col. Gustave R. Lukesh, who has been both division engineer and district engineer, will remain in charge of the division.

Carey H. Brown, who, as stated in the issue of June 5, has resigned his commission in the Corps of Engineers, is not, as there stated, director of improvements in the city of Rochester, N. Y., but is executive director of the Rochester Civic Improvement Association, Inc., a group of private citizens organized to promote interest in city, village, town, county and regional planning. Harold W. Baker is commissioner of public works of Rochester and his principal assistants are Henry L. Howe as director of design and construction and John V. Lewis as director of maintenance and operation.

Society Calendar

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; fall meeting, St. Louis, Mo., Oct. 1-3.

AMERICAN WELDING SOCIETY, New York; fall meeting, Chicago, Sept. 22-27.

NATIONAL SAFETY CONGRESS, Chicago; annual meeting, Pittsburgh, Pa., Sept. 29-Oct. 3.

CHARLOTTE (N. C.) ENGINEERS CLUB at a recent meeting listened to a talk by G. C Harkey, engineering director of the Air Welding Institute of New York, on liquid oxygen in its commercial application.

Ralph J. Fogg, who has been a member of the Lehigh University faculty since 1908 and professor of civil engineering since 1919, has resigned to reenter the industrial field. He will be succeeded by Clarence H. Sutherland, associate professor of structural engineering, Massachusetts Institute of Technology.

Henry R. Stevens has been appointed special Northwest representative for the Hoosier Engineering Co., of Chicago, erectors of substations and transmission lines. Mr. Stevens has been identified with power development on the Pacific Coast and in the Orient since 1902, and has been in private practice in Seattle since 1928.

J. B. Brokaw, since 1924 chief engineer of the Eastern Oregon Light & Power Co., Baker, Ore., has resigned to accept the position of assistant manager with the Peoples' West Coast Hydro-Electric Corp., California Public Service Co. and Western States Utilities Co., with headquarters in Portland. These companies are subsidiaries of the Peoples Light & Power Co., New York.

Stuart R. Ives, vice-president and general manager, Lyle Culvert & Pipe Co., Minneapolis, Minn., has been appointed general manager of the Armco Culvert Manufacturers Association, with headquarters at Middletown, Ohio, effective July 1, succeeding H. W. Rinearson. Previously to his joining the staff of the Lyle Culvert & Pipe Co., early in 1929, Mr. Ives was connected with the American Rolling Mill Co. for thirteen years.

John C. Gotwals, major, Corps of Engineers, who has been in charge of the St. Louis district, has been appointed to a four-year term as one of the three commissioners of Washington, D. C. He will have charge of streets, sewers, water supply and public utilities. His term as commissioner will begin on July 21. Major Gotwals, who is 45 years old, entered the army as a civilian employee just before the World War. He was formerly a member of the Illinois River Commission.

Obituary

Robert Grier Hemphill, for the past ten years United States irrigation engineer for Texas, with offices in San Antonio, died recently in Abbeville, S. C. Mr. Hemphill was 45 years old.

George W. Brown, secretary-manager of the Louisiana Corrugated Culvert Co., of Baton Rouge, La., died on July 12 from injuries received in an automobile accident the night previous. Before going to Baton Rouge Mr. Brown was connected with the engineering division of the Tennessee state highway department.

Robert A. Shailer, of New York City, died on July 7 in his 68th year. Mr. Shailer, who was born in Boston, was chief engineer in the construction of the East Boston tunnel and the Scollay-Haymarket Square subway, as well as consulting engineer in the construction of the Cambridge rapid transit tube. He was also chief engineer on several New York subway construction projects.

William Newton Ryerson, president of the Trojan Engineering Corp., New York City, died on July 7 after a lingering illness. In 1905 Mr. Ryerson became assistant superintendent of construction for the Niagara Construction Co., and later in the same year superintendent of construction for the Ontario Power Co., Niagara Falls, Ont., which position he held until 1909, when he became general manager and chief engineer of the Great Northern Power Co., Duluth, Minn. In 1925 he was made assistant to the vice-president of the United Gas Improvement Co., of Philadelphia, in charge of operations and engineering. When the Trojan Engineering Corp. was organized in 1928, Mr. Ryerson became its president.

Joseph H. Flick, nationally known as a railroad contractor, died on June 26 at his home in Chicago from a sudden heart attack. Mr. Flick started his career at the age of eighteen as a railroad section hand and shortly after this was intrusted with his first contract in railroad construction by the Davenport & Dakota Railroad Co., involving the construction of the main line of that railroad from Davenport to Sunbury, Iowa, which is now a part of the Chicago, Rock Island & Pacific Railway. On the completion of this job Mr. Flick formed the contracting firm of Flick & Johnson, and when this company was dissolved in 1904, he organized the J. H. Flick Construction Co. in New York. Later this company was dissolved and he reorganized the J. H. Flick Construction Co. in Chicago in 1922. His most recent contracts were the construction of double track and cutoff for the Rock Island lines in Kansas and the Niles Center Division of the Chicago, North Shore & Milwaukee Railroad.

Construction Equipment and Materials

Concrete Pavement Yardage

There is given below a tabulation of concrete pavement yardage awarded during the month of June, 1930, and also the total number of square yards awarded for roads, streets and alleys in the United States for the year 1930 to date as of June 28:

	Sq.Yd. Awarded During June, 1930	Sq.Yd. Awarded From Jan. 1, 1930, to June 28, 1930
Roads........	13,859,893	64,991,887
Streets.......	3,933,834	16,675,788
Alleys.......	361,910	1,152,998
Totals.....	18,155,637	82,820,673

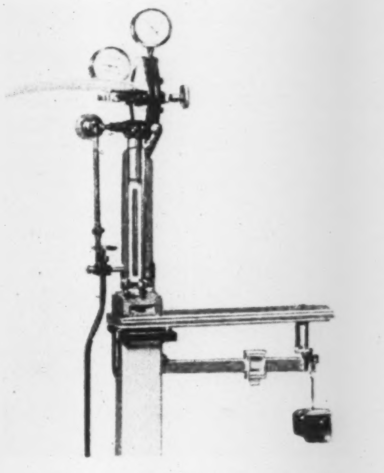
Huge Bucket Elevator Built for Rouen Harbor, France

Dredged sand and gravel is unloaded from barges at the rate of 600 cu.yd. per hour in the harbor of Rouen, France, by means of a recently completed floating elevator weighing more than 2,100 tons. The machine is supported by two pontoons, each 200x25 ft. in size, drawing 9 ft. of water. The conveying mechanism consists of a chain of 47 buckets, each with a capacity of 18 cu.ft., the lower end of which can be raised and lowered. Material is discharged at the height of 100 ft. above water level into a hopper, from which it falls either to a conveying chute or to a washing chute, both adjustable either horizontally or vertically. Various parts of the elevator are driven by steam or electricity; the bucket chain by a 300-hp. triple expansion engine, the main generator by a similar engine of 520 hp., and an auxiliary generator by a 220-hp. compound engine.

New Developments

Ammonia Feeding Apparatus

By constructing its dry-feed chlorinator of materials which will withstand the action of ammonia, the Paradon Manufacturing Co., Arlington, N. J., has developed what is known as the Paradon Ammoniator, which can be used not only for the application of anhydrous ammonia in the water and sewage purification fields but also for controlling that chemical for practically any purpose.



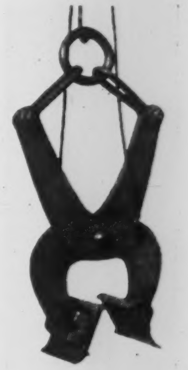
AMMONIATOR MOUNTED ON HEAD OF SCALE

Anhydrous ammonia enters the apparatus as a gas under full tank pressure, which is reduced by an inlet valve actuated by a diaphragm. The ammonia passes along the diaphragm and through an orifice, the flow being regulated by adjusting the difference in pressure between the front and rear of the diaphragm. After passing the orifice, the chemical flows through a meter pressure and shut-off valve which maintains the back-pressure under which the orifice is calibrated and which keeps the apparatus, when not in use, filled with ammonia under pressure, thus preventing the entrance of moisture or dirt. From the latter valve the ammonia goes direct to the point of application.

The ammoniator can be mounted on a metal pedestal or combined with a platform scale. If desirable, an injector can be added to mix the ammonia with an auxiliary water supply.

Tongs Pull Sheetpiling

A handy tool which can be operated by one man at a hoist has been devised by the St. Paul Foundry Co., St. Paul, Minn., for pulling wood or steel sheetpiling. This is lowered over the piling in opened position by means of the two cables fastened near the pivot. A pull on the single cable attached to the ring closes the jaw and clamps the pile tightly. The standard size will grip piling up to 6 in. in diameter; larger sizes are made to order. When handling steel piling, the jaw plates are removed by loosening two bolts.

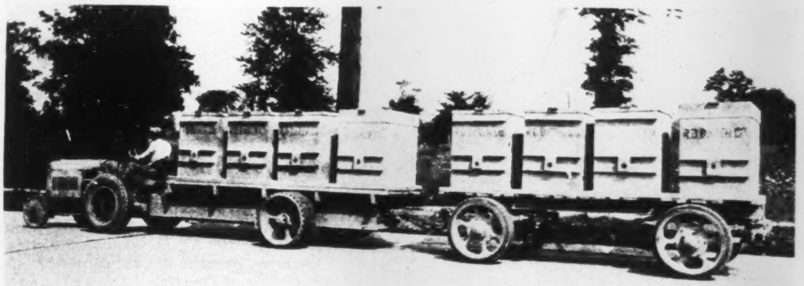


PILING PULLER

Wide Range of Action Features Heavy Leaning Wheel Grader

Use of a 42-in. lateral side shift, by means of which a 12-ft. blade is enabled to make a high reach for bank cutting of 6 ft. 6 in. and to cut a slope of 60 deg., is the notable feature of the new Caterpillar Sixty leaning wheel grader just announced by the Caterpillar Tractor Co., San Leandro, Calif. This unit is the heaviest of the Caterpillar blade graders, weighing 11,300 lb. without scarifier. It introduces a new centralized control system by means of which seven control wheels govern the nine important adjustments of blade pitch and position, wheel adjustment and steering. The wide range and reach of blade are made possible by the 42-in. lateral side shift, by three positions of the connecting link between side shift and circle crossbar, by three blade position connections with the blade beams and by four positions at the extensible lifting links.

The entire lifting mechanism is mounted on anti-friction bearings: tapered roller bearings in worm shaft,



TRACTOR-TRAILER FLEET HAULS CONCRETE ROAD MATERIALS

Concrete paving operations in the vicinity of Detroit are being served by a fleet of 22 McCormick-Deering industrial tractors, each of which hauls a semi-trailer and trailer carrying eight batch boxes from a central proportioning plant to the job. A crane is used to lift the batch boxes from the trailers to industrial railway cars, which perform the last part of the journey. The fleet is owned and operated by the R. D. Baker Co., of Royal Oak, Mich. The trailers are also used for the transportation of gravel to storage piles and for the transfer of industrial railway track sections, the latter being loaded by a tractor with power-operated boom.

LEANING WHEEL GRADER WITH BACK SLOPER ATTACHMENT

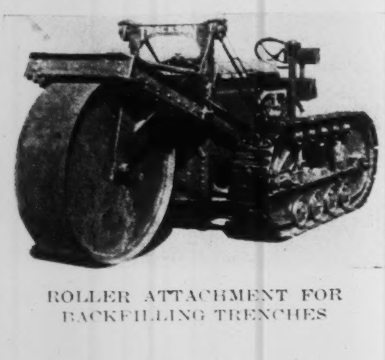
double row ball bearings on the lift shaft, and roller bearings for the compensating lift spring sheaves. Bronze lift gears, adjustable to six points of wear, run against machine-cut steel worms mounted on roller bearings. The compensating spring lift is so mounted as to equalize tension on both ends of the blade and to exert uniform lifting force at any elevation of the blade. It is protected by safety cables. The frame of the machine is built of 9-in. ship channels, weighing 28.6 lb. to the foot. Draft is applied directly to the blade, not through the frame.

A new construction is also introduced for the knuckle arms of the leaning wheels whereby a steel sleeve through the knuckle holds the heavy steel pin. The sleeve also acts as a spacer for the axle angles, allowing the nut on the pin to be drawn tightly up to maintain rigidity. The knuckles pivot on the sleeve, not on the pin. Tapered roller bearings, guarded by cork seals and metal guards, are used in all wheels. Lubrication is by means of pressure grease guns throughout.

Auxiliary equipment available includes a scarifier weighing 560 lb. and a 750-lb. bank sloper with 28-in. bottom blade and 60-in. wing blade.

Tractor-Mounted Roller Tamps Earth in Ditch

A simple, effective and economical method of packing down dirt over newly laid cable, conduit or pipe line is provided in the new trench roller announced by the Trackson Co., Milwaukee, Wis., for mounting on the front end of the model DH Trackson McCormick-Deering crawler tractor. This unit consists simply of a wide steel roller weighted with concrete and a hoist unit. As the latter is identical with the hoist used with the Trackson shovel or bulldozer, these attachments are interchangeable. To meet the requirements of different soil conditions, rollers are available weighing from 3,000 to 4,000 lb., a 3,500-lb. roller being recommended for the average job. It is claimed that a single unit will roll as much as 2,600 lin.ft. of 4-ft. trench in a day, packing down the dirt as fast as it is shoveled or backfilled into the trench. The outfit may be used for rolling over all kinds of underground lines without damaging the cable or casing, provided sufficient dirt is thrown over the pipe before it is rolled. This first layer should be from 10 to 20 in. deep, depending on the nature of the soil. The rest of the backfill is usually rolled in 6-in. layers.



ROLLER ATTACHMENT FOR BACKFILLING TRENCHES

Portable Electric Saw Improved

Refinements in design incorporated into the model 2-A portable electric handsaw, manufactured by Wappat, Inc., Pittsburgh, Pa., include a dust shield of non-shatterable glass, making it possible for the operator to follow a line with full vision; a rip fence; and a foolproof switch which makes it impossible for the saw to be accidentally started. A button at the operator's thumb must be pressed before the trigger switch will act. The trigger itself is of the full-trip variety, taking strain off the index finger and making possible a more comfortable grip on the tool.

PORTABLE ELECTRIC HANDSAW

Costs and Contracts

E. N.-R. Index Numbers

Cost			Volume		
July 1.	**1930**	**200.95**	**June,**	**1930**	**324**
June 1.	1930	203.36	May.	1930	354
July 1.	1929	204.77	June.	1929	347
Average.	1929	207.02	Average.	1929	317
Average.	1928	206.78	Average.	1928	287
1913	......	100.00	1913	......	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of July 17, with some comparisons, total as follows:

(In Thousands of Dollars)

Buildings:	July 17. 1930	Average. Last Four Weeks 1930	Average. Last Four Weeks 1929
Industrial	$1.794	$6.286	$9.056
Other	22.286	26.435	28.326
Streets and roads..	19.686	15.840	14.719
Other eng. constr..	21.830	13.667	20.120
Total	$65.596	$62.229	$72.222

Total, all classes Jan. 1 to July 17:

1930	$2.028.172
1929	2,467.018

Business Notes

The Leipzig Trade Fair, comprising 8,500 exhibits from 24 countries, will be held in Germany from Aug. 31 to Sept. 5. American headquarters are at 11 West 42d St., New York City.

Adam Garver, superintendent of the York (Pa.) plant of the American Chain Co., Inc., New York City, was recently presented with a gold medal at a testimonial dinner celebrating the completion of more than 50 years' service with the chain industry in York.

E. E. Wild, who resigned as general manager of the Columbian Steel Tank Co., Kansas City, Mo., a few months ago after twelve years of service, has returned to the same organization as sales promotion manager.

John T. Broderick, secretary of the manufacturing committee, General Electric Co., Schenectady, N. Y., retired on July 1 after 41 years of continuous service with the company, 36 of which were spent in the position from which he retires.

A. O. Smith Corp., Milwaukee, Wis., is erecting a seven-story engineering and research building to house an eventual research staff of 1,000 engineers and scientists.

Prest-O-Lite Co., Inc., New York City, has placed in operation a new plant for the manufacture and distribution of dissolved acetylene at Casper, Wyo.

Hungerford & Terry, Inc., and the **Inversand Co.**, Clayton, N. J., have appointed W. A. Kennedy & Co., Charlotte, N. C., their Southern sales representative.

Olympic Machinery Co., Seattle, Wash., has changed its name to the Bert G. Danley Co. There is to be no change in the personnel of the company.

Michigan Valve & Foundry Co., Detroit, Mich., has acquired the business, plant and assets of the Columbus Valve & Mfg. Co., Columbus, Ohio.

Wagner Electric Corp., St. Louis, Mo., has combined its sales office and service station in Atlanta, Ga.

Clegg Lock Washer Co., Chicago, Ill., has appointed C. H. Armstrong general manager in complete charge of production, marketing and administration. Mr. Armstrong was formerly director of trade extension for the Textile Bag Manufacturers Association.

Masonite Corp., Chicago, Ill., has bought outright the Dowd Concrete Form System, Inc. The Dowd form system, utilizing Masonite Presdwood, will be made available to all contractors without charge. This service will be under the management of E. B. Bushnell, head of the concrete form department.

Jenkins Bros., New York City, have announced the election of James R. White as vice-president and also his appointment as director of sales.

Columbia Steel Co., San Francisco, Calif., a subsidiary of United States Steel Corp., has acquired by purchase the properties of the United Steel Products Co., Columbia department, with mines, quarries, furnaces, foundries, mills and warehouses located in Colorado, Utah, California, Oregon and Washington.

Cutler-Hammer, Inc., Milwaukee, Wis., has acquired all common stock of Schweitzer & Conrad, Inc., of Chicago, manufacturer of high-voltage electrical equipment. Schweitzer & Conrad will continue to operate as an independent manufacturing and selling unit.

Hercules Powder Co., Wilmington, Del., is planning to spend $175,000 in the rearrangemnt of plant facilities at its explosives plant in Carthage, Mo. Thirteen small buildings in the plant area are to be replaced by nine new buildings. The work is being carried out by Hercules employees.

Frey Steel Products Co., Philadelphia, Pa., has been organized by E. C. Frey, formerly general manager and treasurer of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., for the manufacture and sale of lightweight steel sections. The plant is located at Milton, Pa., and the office at 620 Lewis Tower, Philadelphia. The Pearce Fireproof Co., Philadelphia, is acting as distributor. Millard D. Meyers will have full charge of plant operations.

John M. Callen, for a number of years vice-president and director of the Reading Iron Co. and the Thomas Iron Co., of Reading, Pa., died on July 2. He had been in the employ of the Reading Iron Co. since July 1, 1899.

Unit Prices From Current Construction Bids

New Jersey Approach Excavation and Paving for Hudson River Bridge

APPROACH work at the New Jersey end of the Hudson River bridge, between Fort Washington and Fort Lee, consists principally of: (1) excavation and fill for the main approach and grading of Hoyt Ave.; (2) grading and paving of Hudson Terrace in the vicinity of the approach; (3) construction of piers, abutments and retaining walls for the crossing of the bridge approach over Hudson Terrace, as shown on the drawing. Contract was awarded by the Port of New York Authority on June 5, 1930, to George M. Brewster & Son, Inc., Bogota, N. J., which was the second lowest bidder, for the sum of $287,652.

Excavation includes the plaza area for a width of 360 ft., in which the streets will be closed; cutting Hoyt Ave. to the north and south of this area to bring it to the grade of the plaza; cutting two ramps from the Plaza to Hudson Terrace; lowering of the present grade of Hudson Terrace for a distance of 145 ft. north and 180 ft. east from Hudson Terrace to the present approach excavation.

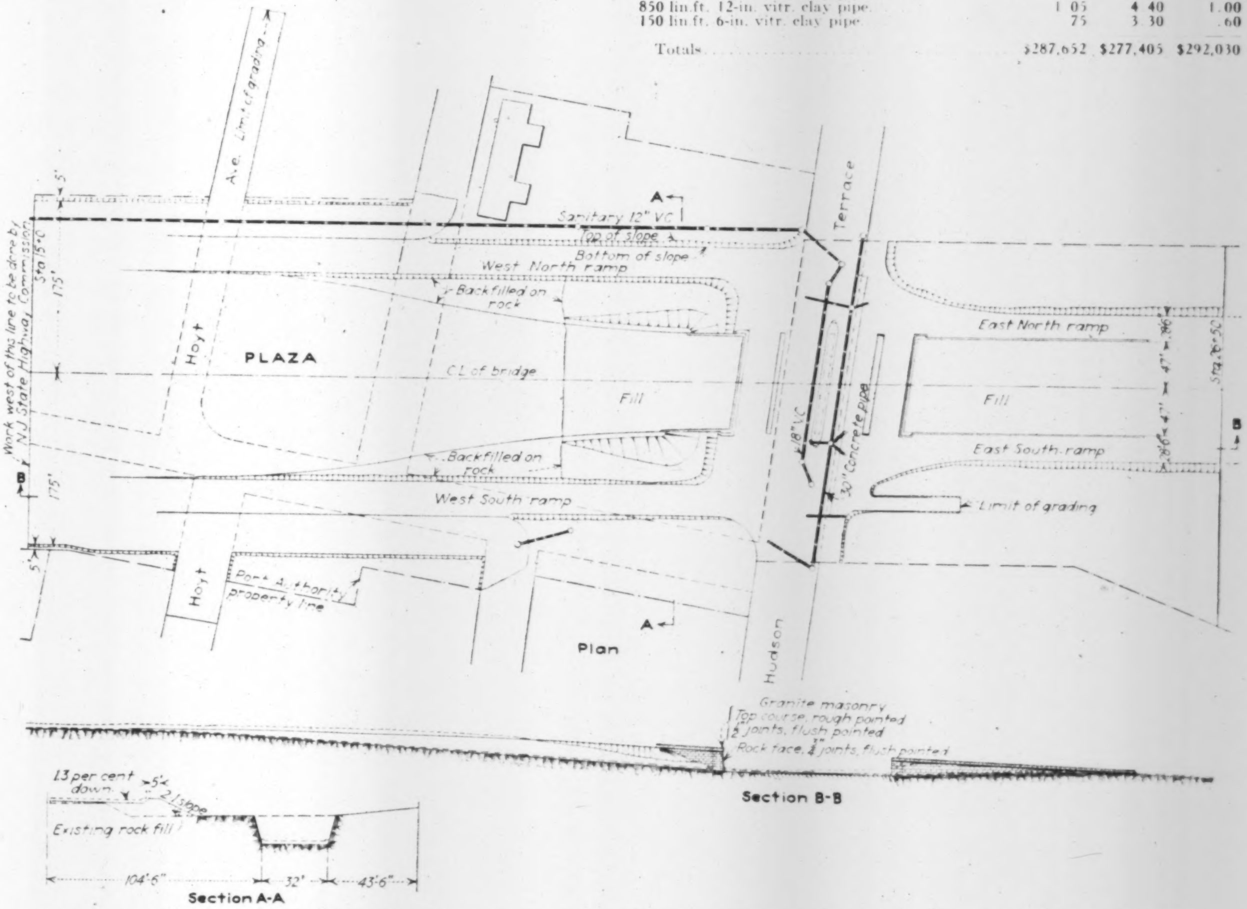
The crossing over Hudson Terrace consists of four steel spans on steel columns. The superstructure is not included in this contract. There are two granite-faced abutments with granite-faced sidewalls to support the ends of the steel spans and retain the fill for the approach. Between the abutments are three concrete piers, two on spread footings on earth and the third on rock.

Paving of Hudson Terrace must be completed by Sept. 1, 1930, and the contractor must, therefore, complete grading and pier foundations before that date.

The concrete mix is specified by the engineer. The average strength in 28 days is 2,500 lb. for all concrete except in the paving of Hudson Terrace, which will have an average strength of 4,000 lb., determined and controlled by the water-cement ratio method. The amount of water will probably be 6½ gal. per bag for 2,500 lb. and 4½ for 4,000 lb. The slump is 2 to 3 in. Coarse aggregate may be gravel or crushed stone except that for the Hudson Terrace pavement, which is to be traprock. This pavement will be laid in one course, finished in strips 10 ft. wide and kept wet for ten days.

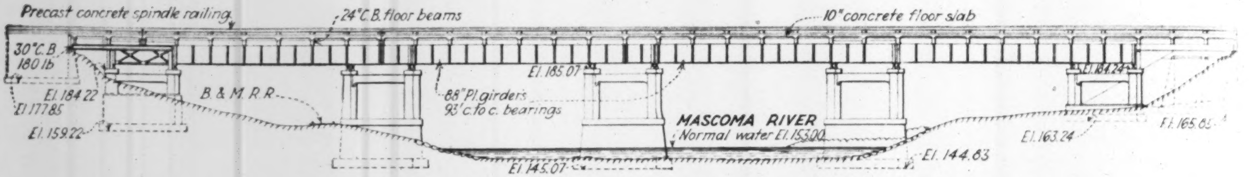
Bidding—Bids were received from thirteen contractors and unit prices of the lowest three are tabulated below: (A) George M. Brewster & Son (contract), $287,652; (B) Corbisello Bros., Inc., Fairview, N. J. (lowest bid), $277,405; (C) Anthony Cianciulli Corporation, New York, $292,030.

	A	B	C
74,000 cu.yd. excavation	$2.86	$2.13	$2.75
2,000 cu.yd. conc., except that specified in items 4 and 9	11.00	16.50	11.00
280 cu.yd. granite, in place, except that specified in item 8	100.00	146.30	130.00
1,600 sq.yd. paving	2.00	4.40	2.50
3,500 bbl. cement, mixed in conc	3.00	3.30	2.85
180,000 lb. reinforcing steel	.04	.09	.055
7,000 lb. cast iron	.03	.11	.08
270 lin.ft. granite curb	4.55	5.50	4.50
340 lin.ft. 30-in. reinforced conc. pipe	5.50	7.70	6.50
380 lin.ft. 18-in. vitr. clay pipe	2.10	5.06	3.50
850 lin.ft. 12-in. vitr. clay pipe	1.05	4.40	1.00
150 lin.ft. 6-in. vitr. clay pipe	.75	3.30	.60
Totals	$287,652	$277,405	$292,030


Ave. Limit of grading
A
Sanitary 12" V.C.
Top of slope
Bottom of slope
West North ramp
Backfilled on rock
Terrace
PLAZA
Hoyt
C.L. of bridge
Fill
Backfilled on rock
West South ramp
Work west of this line to be done by N.J. State Highway Commission
Sta 15+0
175'
175'
5'
5'
B
Hoyt
Port Authority property line
A
Plan
Hudson
18" V.C.
30" Concrete pipe
East North ramp
Fill
East South ramp
Limit of grading
38'
47'
47'
38'6"
Sta 26+50
B
Granite masonry
Top course, rough pointed
½ joints, flush pointed
Rock face, ¾" joints, flush pointed
Section B-B
1.3 per cent down
5'
2:1 slope
Existing rock fill
104'6"
32'
43'6"
Section A-A

PLAN, LONGITUDINAL SECTION, AND TYPICAL CROSS-SECTION OF NEW JERSEY APPROACH AND HUDSON TERRACE WORK; HUDSON RIVER BRIDGE

Unit Prices From Current Construction Bids



ELEVATION OF MASCOMA RIVER HIGHWAY BRIDGE, LEBANON, N. H.
Piers are skewed at angle of 36 deg. 18 min. with center line of bridge.

Steel Highway Bridge in New Hampshire

THE New Hampshire highway department let contracts in March, 1930, for a steel bridge over the Mascoma River at Lebanon. Prices were $26,590 for the substructure and $26,850 for the superstructure, with engineer's estimates $41,822 and $43,775 respectively. There are four deck-plate girder spans and the total length is 453 ft. Lowest three bidders were: *(superstructure)* (A) Albany Bridge Construction Co., Inc., Albany (contract); (B) Boston Bridge Works, Inc., Cambridge; (C) McClintic-Marshall Co., Boston; *(substructure)* (A) Eastern States Bridge Co., Concord (contract); (B) C. D. Marsh Construction Co., Woodsville; (C) H. S. Knight, South Royalton, Vt.

Superstructure	A	B	C
475,600 lb. structural steel	$0.0511	$0.0536	$0.0613
25 working days	25	25	25
8 cast-steel rockers	109	94	100
8 cast-steel pedestals	100	87	85
Totals	$26,850	$27,565	$31,834

Substructure	A	B	C
800 cu.yd. dry excav.	$2.50	$2.50	$2.00
78 cu.yd. wet excav.	10.00	26.00	8.00
225 cu.yd. Class B conc.	18.75	22.22	29.75
847 cu.yd. Class C conc.	18.00	16.15	18.00
18,635 lb. reinforcing steel	0.04	0.06	0.06
Working days	50.00	50.00	50.00
Totals	$26,590	$27,075	$30,282

Sewers in New Orleans

CONTRACTS were let on April 30 by the sewerage and water board of New Orleans, La., for submains and laterals for (1) Edgewood, (2) Lakeview, (3) Gentilly, totaling $413,835. Each job was to start within 30 days and be completed within twelve months, with a penalty of $50 per day. In sandy soil the contractor may use steel sheeting for trench support and may pull out this sheeting without placing permanent wooden second sheeting. The exception is for trenches more than 16 ft. deep, which must be permanently sheeted.

All 8-in. sewers are vitrified clay. For 10- or 12-in. the board may require either clay or machine-made concrete. Pipe sewers above 12-in. are concrete; 15-in. may be plain or reinforced; 18-in. or more are reinforced concrete.

Where foundation planks under sewers are laid longitudinally or laid transversely but not on rangers, the lumber is No. 2 common pine and the price is fixed at $45 per 1,000 ft. in place. Where rangers are embedded below the foundation and braced, the price is $50.

The lowest three bids on each contract are:

Edgewood	A. P. Boh & Co.	John B. Mooney	Globe Construction Co.
Lakeview	J. B. McCrary Co.	H. W. Bond & Bro.	Dysard Construction Co
Gentilly	H. W. Bond & Bro.	A. P. Boh & Co.	J. B. McCrary Co.

Unit prices on the three jobs ran fairly uniform, and all items are listed for contract 106-S, for Lakeview. This district is bounded by City Park Ave., West End Blvd., Harrison Ave. and Orleans Ave. The board reserved the right t require the contractor to construct sewers at the prices bid in any street in this area in which sewers must be placed in advance of subsurface drainage or paving. The tabulation gives the unit prices of the lowest three bidders: A, McCrary; B, Bond; C, Dysard.

	Depth, Ft.	A	B	C
30 lin.ft. 30-in. cast iron	18–20	$17.00	$25.00	$17.34
400 lin.ft. 30-in. reinf. con.	16–18	16.35	13.00	16.92
100 lin.ft. 30 in. reinf. con.	14–16	11.50	12.00	15.72
750 lin.ft. 27-in. reinf. con.	14–16	10.30	10.00	14.82
1,300 lin.ft. 21-in. reinf. con.	14–16	7.85	9.50	13.25
200 lin.ft. 21-in. reinf. con.	12–14	6.65	9.25	11.25
600 lin.ft. 21-in. reinf. con.	10–12	5.60	9.00	10.05
100 lin.ft. 20-in. cast iron	16–18	8.50	15.50	14.00
200 lin.ft. 18-in. reinf. con.	14–16	7.25	8.80	8.68
1,200 lin.ft. 18-in. reinf. con.	12–14	6.10	7.75	7.75
1,100 lin.ft. 18-in. reinf. con.	10–12	5.05	7.25	6.70
300 lin.ft. 18-in. reinf. con.	8–10	4.15	7.00	5.40
200 lin.ft. 15-in. reinf. con.	12–14	5.50	7.30	7.35
1,750 lin.ft. 15-in. conc.	10–12	4.10	7.00	6.30
700 lin.ft. 15-in. conc.	8–10	3.20	6.60	4.80
100 lin.ft. 12-in. conc.	12–14	4.75	6.20	5.30
250 lin.ft. 12-in. conc.	10–12	3.85	6.10	4.10
250 lin.ft. 12-in. D.S. terra cotta	10–12	3.93	6.40	4.20
350 lin.ft. 12-in. conc.	8–10	2.95	6.30	3.60
350 lin.ft. 12-in. D.S. terra cotta	8–10	3.03	6.20	3.70
350 lin.ft. 12-in. conc.	6–8	2.00	4.95	2.10
350 lin.ft. 12-in. D.S. terra cotta	6–8	2.08	6.00	2.27
200 lin.ft. 12-in. cast iron	12–14	4.80	9.10	4.57
100 lin.ft. 10-in. conc.	12–14	4.40	6.20	5.10
250 lin.ft. 10-in. conc.	10–12	3.60	6.10	4.10
250 lin.ft. 10-in. terra cotta	10–12	3.69	6.00	4.20
650 lin.ft. 10-in. conc.	8–10	2.75	3.90	3.00
650 lin.ft. 10-in. terra cotta	8–10	2.84	4.00	3.10
400 lin.ft. 10-in. conc.	6–8	1.75	4.85	[illegible].80
400 lin.ft. 10-in. terra cotta	6–8	1.84	4.95	1.80
100 lin.ft. 8-in. terra cotta	12–14	4.25	4.45	4.95
700 lin.ft. 8-in. terra cotta	10–12	3.45	3.35	3.87
3,100 lin.ft. 8-in. terra cotta	8–10	2.65	3.25	3.00
31,000 lin.ft. 8-in. terra cotta	6–8	1.74	.90	1.76
8,700 lin.ft. 8-in. terra cotta	4–6	1.17	.80	1.15
100 lin.ft. 6-in. terra cotta standpipe, vertical ft.		2.15	.50	.90
2 manholes 18 to 20 ft. deep		275.00	350.00	250.00
1 manhole 16 to 18 ft. deep		225.00	300.00	225.00
5 manholes 14 to 16 ft. deep		175.00	275.00	200.00
14 manholes 12 to 14 ft. deep		150.00	200.00	180.00
17 manholes 10 to 12 ft. deep		125.00	160.00	160.00
30 manholes 8 to 10 ft. deep		102.00	130.00	130.00
48 manholes 6 to 8 ft. deep		85.00	93.00	110.00
20 manholes under 6 ft. in depth		70.00	85.00	90.00
34 flush tanks complete		90.00	150.00	95.00
100 cu.yd. extra conc. grade "A"		15.00	12.00	14.00
50 cu.yd. extra conc. grade "B"		12.00	11.50	13.00
150 cu.yd. extra brickwork		22.00	25.00	19.00
100 cu.yd. extra excav., over 16 ft. deep		3.50	.70	3.00
100 cu.yd. extra excav. under 16 ft. deep		2.25	2.00	1.50
50,000 ft. B.M. foundation lumber, laid longitud.		45.00	45.00	45.00
50,000 ft. B.M. foundation lumber laid transversely		50.00	50.00	50.00
1,000 cu.yd. clamshells furnished and placed		4.00	3.20	4.00
50 cu.yd. sand furnished and placed		3.75	3.00	4.20
50 cu.yd. gravel furnished and placed		4.75	3.75	4.50
500 lin.ft. round piling		1.50	2.00	1.05
1,000 ft. 1,000 F.B.M. capping and decking		100.00	100.00	75.00
200 sq.yd. pitch asphalt		5.00	4.00	4.00
20 sq.yd. rock asphalt		5.00	4.00	3.50
200 sq.yd. warrenite bitulithic		5.00	4.00	3.50
10 sq.yd. vitr. brick		6.00	2.00	5.00
10 sq.yd. creosoted wood bloc		5.00	3.00	5.50
10,000 sq.yd. gravel		1.00	.60	1.25
1,000 sq.yd. shells		.95	.50	1.30
100 sq.yd. slag		1.25	.40	2.50
1,500 sq.yd. hard surfacing		2.75	.50	2.25
2,000 sq.yd. asphalt surf. on gravel or similar base		1.50	1.50	2.00
200 sq.yd. artificial stone footwalks		1.00	3.20	2.00
500 sq.yd. artificial stone driveways		1.00	3.10	2.50
50 sq.yd. brick		1.00	.50	3.00
50 sq.yd. flagging		1.00	.60	1.50
200 lin.ft. wooden curbing		.25	.40	.20
200 lin.ft. stone durbing		.25	.45	1.00
200 lin.ft. reinf. conc. curb		1.00	1.10	1.10
Totals		$202,362	$202,409	$235,797

CONSTRUCTION NEWS

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue.

Location	*Project*	*Cost*	*Status*
Sewers			
Cleveland	Sewage disposal	$15,000,000	Proposed
Columbus (O.)	Sewer improvements	4,982,000	Proposed
Bridges			
Cleveland	Bridge	1,755,000	Bids asked
Amarillo (Tex.)	Bridge	1,000,000	Contract
Seattle	Bridge	1,247,000	Contract
Excavation and Dredging			
Princeton (Ind.)	Levees	1,000,000	Proposed
Unclassified			
Pennsylvania, Ohio and New York	Pipe line	5,000,000	Contract
New York	Freight terminal	10,000,000	Proposed
Factories and Mills			
Pittsburgh	Refinery	1,500,000	Proposed
Seattle	Assembly plant	3,000,000	Proposed
Power Plants			
Toronto (Ont.)	Hydro electric plant	1,500,000	Proposed
Buildings			
Springfield (Mass.)	Hospital	1,000,000	Bids asked
Hagerstown (Md.)	Penitentiary	6,000,000	Proposed
Newton (Mass.)	City Hall	1,000,000	Proposed
Grand Rapids	Auditorium	1,500,000	Proposed
Philadelphia	Court building	3,000,000	Proposed
San Francisco	Schools	1,500,000	Proposed
Chicago	High school	4,000,000	Bids asked
Cleveland	Board educ. headquarters	1,137,527	Contract
San Antonio	High school	1,000,000	Bids asked
San Francisco	Studios, etc	2,800,000	Proposed
Chicago	Transportation	1,000,000	Contract

WATERWORKS

PROPOSED WORK

Ariz., Phoenix—Camelback Water Conservation Dist., preliminary plans eight 20 in. wells equipped with 150 hp. deep well turbine pumps and motor, 7 booster pumps, 8 mi. 11,000 volt transmission line, 100,320 lin.ft. 12- to 24-in. plain and rein.-con. pipe, 3 mi. 4- to 8-in. c.i. pipe, two 50,000 gal. reservoirs. $425,000. Reed & Baker, Fleming Bldg., engrs.

Ind., Bloomington — Waterworks improvements, incl. new standpipe, reservoir, $140,000. C. B. Carpenter, Bloomington, engr.

Ind., East Chicago—Bd. P. Wks., improving waterplant, equipment. $500,000. Z. B. Campbell, East Chicago, engr.

BIDS ASKED

Md., Baltimore — July 23, by Bd. Awards, valves, hydrants for Bureau Water Supply. E. G. Rost, Municipal Bldg., water engr.

Mich., Detroit—July 19, by Dpt. Purchases & Supplies, J. E. Mills, comr., 735 Randolph St., two hundred 6 in. two hundred 8 in. twenty-five 10 in., and fifty 12 in. gate valves, for Dpt. Water Supply.

Miss., Indianola — July 21, by City Clerk, waterworks extensions, incl. 1,500 ft. each 8 and 6 in. c.i. mains, 100,000 gal. tank on 100 ft. tower, fitting Election July 18 (extended date) $20,000, for same.

Mo., Ava—See "Contracts Awarded."

N. J., Hillsdale—July 21, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, installing water lines and service distribution piping at Hillsdale Hospital. $15,000. C. N. Leathem, Trenton, state archt.

N. Y., New York—July 22, by Bd. Water Supply, 346 Bway., one combination 5 ft. x 10 ft. sluice-gate and operating mechanisms for Uptake Chamber 1, Hill View Reservoir, Contr. 240. G. J. Gillespie, pres.

Okla., Norman—City Bd. Comrs. in market 2 Diesel engines, 2 belt connected centrifugal pumps, for Waterworks Dpt., O. Ogburn, city clk.

CONTRACTS AWARDED

Conn., Bloomfield—Town, c.i. bell and spigot mains, appurtenances, incl. 950 ft. 8 in., 1,200 ft. 6 in. and 225 ft. 3 in. pipe, to B. Silvester, 21 Mapleton St., Hartford. Est. $15,000.

Ill., Chicago—Bd. Local Impvts., City Hall, water service pipes in West 127th and 128th Places, West 122nd and 128th Sts., Branard, South McVickers, Parnell, Norman and Eggleston Aves., to Walsh & Metzger, 6828 South Chicago Ave.; Giddings and Slocum Sts., South Kilbourn, North Tripp, North Melvina, South Karlov, North Meade, North Moody and North Melvina Aves., to P. J. Collins 5521 Bway., East 96th, 97th and 98th Places, East 96th, 97th and 98th Sts., Bennett, Euclid and Chappel Aves., to Reliance Plumbing Co., 2430 West Van Buren St.; North McVickers, North Meade, North Moody and North Melvina Aves., to Washington Plumbing & Heating Co., 461 North Halsted St.

Mass., Boston—Dpt. P. Wks., laying, relaying water pipes in Roxbury to Appel & O'Toole, 78 Moreland St., Roxbury; Dorchester, to J. Susi & Bros., 64 Richfield St., Dorchester; Brighton, to Roslindale Contr. Co., Inc., 35 Auburn St., Roslindale. Total est. $15,000. Noted June 12.

Mo., Ava — City, for 850 ft. well, to O. O. Jonnum, Nevada, $2,852; extending water distribution system, by own forces under supervision Water Superintendent. Est. $15,000.

O., Fairview (br. Cleveland)—See "Sewers."

O., Findlay — For 40,000 gal. wash water tank and 500,000 gal. storage tank, to Pittsburgh Constr. Co., Diamond Bldg., Pittsburgh, Pa., $4,000 and $30,900 respectively.

Okla., Claremore—Dirt dam, to Garrett Constr. Co., Muskogee, $44,536 est. $45,000; concrete reservoir, intake, c.i. pipe line, new aerator, to W. B. Carter, 7 North Rockford St., Tulsa, $109,600 est. $110,000. Noted June 19.

Pa., South Greensburg—Westmoreland Water Co., general contract 4 m.g. filtration plant, concrete filter beds, two 2 story, basement buildings, to J. E. Snyder Co., 1st Natl. Bank Bldg. Est. $75,000.

R. I., Cumberland (mail Manville) — Town Bd. Water Comrs., water service supplies and pipe, to Cement Lined Pipe Co., 591 Washington St., Lynn, Mass. Est. $65,000. Noted Apr. 24.

Tenn., Franklin — City, 2 m.g. reservoir, to W. L. Hailey & Co., 314 42nd St. Ave. N., Nashville, $31,000; 5 mi. pipe lines, will be constructed by city, $40,000. Est. $75,000.

Wash., Olympia—For 7,780 ft. 16 in. sand cast water mains, to Pacific Waterworks Supply Co., Atlantic St. Dock, Seattle, $19,247.

Ont., Napanee—City, addition to waterworks pump house, coagulation basin, mixing chamber to R. H. McGregor Constr. Co. Ltd., 79 Adelaide St. E. Toronto. Est. $15,000.

SEWERS

PROPOSED WORK

Calif., Tehachapi—See "Public."

Ind., Terre Haute—For 1 mi. sanitary sewers, incl. 20 x 14 x 10 ft. sediment tank, 8, 10 and 12 in. vitr. tile, in Demming Park Subdivision. $26,400. W. R. Paige, Terre Haute, engr.

Mich., Ann Arbor—Making plans 1½ mi. concrete trunk sanitary sewers from Packard St. and Belt Line cut-off to Huron River. $350,000. G. H. Sandenburg, city engr.

Mo., St. Louis—Bd. P. Serv., City Hall, soon takes bids 16 ft. concrete horseshoe sewer from Kingshighway Northwest and Halls Ferry Rd. to Riverview Dr. and North Bway. and then about 1/5 mi. open channel sewer to Mississippi River. $700,000; Rock Creek Dist. Sewer 18, 19,360 ft. 8- to 27-in. vitr. clay pipe, Glaise Creek Storm Water Sewer 30, 1,550 ft. 12- to 27-in. vitr. clay pipe, 910 ft. 8- to 27-in. v.c. sewer in Southwestern Dist. Sewer 5, Cheltenham Dist. Sewer 2, 365 ft. 8 in. vitr. clay pipe, Harlem Creek Dist. Sewer 28, 1,190 lin.ft. 8- to 18-in. vitr. clay pipe, Harlem Creek Dist. Sewer 27, 1,145 ft. 10- to 15-in. vitr. clay pipe, $32,950.

N. J., Spring Lake—Bd. Boro Council, Boro Hall, preliminary plans municipal sewage disposal plant. $150,000. G. R. Moore, 603 Mattison Ave., Asbury Park, engr.

N. Y., Watertown—Soon takes bids 2 mi. 10- to 18-in. vitr. and 21 in. rein.-con. outfall sewer. $275,000 voted for same. F. O'Brien, city engr.

O., Cleveland—Preliminary plans intercepting sewers in Walworth and Kingsbury Runs. $2,000,000. R. Hoffman, city engr.

O., Cleveland—City Council authorized $50,000 to cover cost of engineering survey, sewage disposal plant, East 140th St. and Lake Erie. Total est. $15,000,000. R. Hoffman, city engr. Consulting engineer selected soon.

O., Columbus—R. H. Simpson, city engr., and J. H. Gregory, consult. engr., Johns Hopkins University, Baltimore, Md., made surveys and submitted report for sewer improvements. Est. $4,982,000.

Okla., Britton—City postponed indefinitely taking of bids outfall sewer. $25,000. Riggins & McMasters, 603½ West Main St., Oklahoma City, engrs.

Okla., Nichols Hills (P. O. Oklahoma City)—City postponed letting contract storm and sanitary sewers. $200,000. Benham Eng. Co., Perrine Bldg., Oklahoma City, engrs. Noted July 3.

BIDS ASKED

Calif., Los Angeles—July 28, by Bd. Supervs. Los Angeles Co., 37,410 ft. 8 in. vitr. main sewer, 1,070 ft. 8 in. vitr. main sewer with concrete cradle, manholes, junction chambers, Blanchard and Bostwick Sts., County Impvt. 758.

Ill., Chicago—July 22, by City at office Bd. Local Impvts., City Hall, tile sewers, brick manholes, catch basins in North Paulina St., Higgins, South Newcastle, South Oak Park, South Mulligan, South Narragansett, South Nagle, South Natchez, South Neenah, South Nashville, South Natoma, Damen, North and South Archer Aves. M. J. Faherty, pres.

Ill., Chicago—July 24, by Bd. Local Impvts., City Hall, 6 mi. 9½ x 12 ft. horseshoe concrete to 4 ft. brick sewers in West Monroe, North and South Peoria, Loomis, West Madison, Sheldon, North and South Wood, North and South Leavitt Sts. $2,566,000. M. J. Faherty, pres.

Ill., Princeton—July 28, by City, rein.-con. settling tanks, reservoir, brick filter building. $25,000. Shields, Jordan & Roe, 205 West Wacker Dr., Chicago, engrs.

Kan., Abilene—July 22, by M. E. Calkins, city clk., City Hall, lateral and intercepting sewers, disposal plant, incl. 35 manholes, 6 flush tanks, 4,000 cu.yd. excav., 620 cu.yd. concrete, yard piping, pumping and sludge heating equipment. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs. Noted June 12.

Me., Portland—Taking bids 3,091 ft. 8- to 42-in. pipe and brick sewer in Mackworth St. and Ocean Ave.

See proposal advertising on page 129

LEADITE

Faith in the Unseen

Usually, the largest portion of a Water Works System is Unseen. Beneath paved streets, under river beds and railroad tracks,—through swamps,—in filter galleries, — countless miles of Bell and Spigot Water Mains are daily supplying WATER, one of life's most essential elements, to millions of persons.

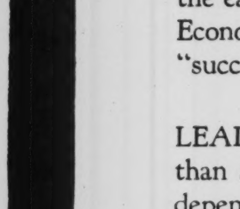
Years upon years of experimenting and experience have definitely proven that Bell and Spigot Pipe has no superior for Water Main Construction . . . Long Life,—Resistance to various forms of corrosion,—Ease of handling and the desired flexibility of such installations,—Absolute Dependability, —are all factors favoring the use of Bell and Spigot Water Mains.

In the vast net-work of water supply arteries which lie buried beneath the earth's surface, LEADITE, too, has proven not only Dependable, but Economical,—for thousands of miles of Bell and Spigot Water Mains are "successfully jointed" with LEADITE.

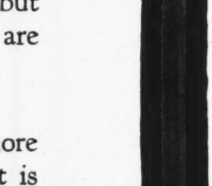
LEADITE has been specified and used by Water Works Men for more than a Quarter of a Century,—and, like the pipe which it joints, it is dependable,—so, with reference to both Bell and Spigot Water Mains and LEADITE JOINTS, Performance has proven that there is "Faith in the Unseen."

The Pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa.



No Caulking



Sewers (Continued)

Mass., Boston—July 23 and 26, by Dpt. P. Wks., J. A. Rourk, comr., sewerage works in Dorchester. $25,000.

Mich., Roseville—July 21, by W. E. Utt, village clk., 22,582 ft. 12- to 26-in. vitr. storm sewers with 82 standard manholes, 74 catch basins, 77 inlets 3,555 ft. 10 and 12 in. catch basin connections. M. Van de Greyn, Gratiot Ave. and Meier Rd., engr.

New York—July 25, by Westchester Co. Sanitary Sewer Comn., Court House, White Plains, constructing Sects. C and F, Hutchinson Project, Eastchester and Mount Vernon.

N. Y., Brooklyn—July 23, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in East 52nd and East 57th Sts., Clarendon and Beverly Rds.

N. Y., Dannemora — July 29, at office Dpt. Correction, State Office Bldg., Albany, storm and sanitary sewers at Clinton Prison. R. F. C. Kieb, comr.; adv. E. N.-R. July 17.

Okla., Shattuck—July 21, by E. Fulton, city clk., 12,000 ft. sanitary lateral sewers in Cherokee and Cheyenne Sts. $25,000. C. A. Wood, Perrine Bldg., Oklahoma City, engrs.

S. C., Greenville—July 22, by A. C. Mann, mayor, and City Council, 20,000 ft. 8- to 10-in. sanitary sewer extension. D. A. Hulick, city engr.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. P. Wks., City Hall, Sect. 34-A, North Outfall Sewer, to Dalmatin & Nikcevich, 841 West 62nd St., $203,635; Sect. 34-B, North Outfall Sewer, to M. Simunovich, 3365 West 66th St., $171,800. Noted June 12.

Ill., Chicago—Bd. Local Impvts., City Hall, drains in West 82nd Pl. and North Ashland Ave., to P. Scalzitti, 2424 North Tripp Ave.; East 98th Pl., East 86th and 98th Sts., and North Major Ave., to N. Ranieri 5036 North Montana St.; East 126th and 127th Sts., Marquette, Manistee, and Muskegon Aves., to A. Scully, 4504 Wrightwood Ave.

Ill., Chicago—Bd. Local Impvts., City Hall, brick, tile sewers, brick manholes, catch basins in West 55th St., South Mason, South Mansfield, South Menard, South Massasoit, South Parkside and South Archer Aves., to E. Till, 5475 Hirsch St.; South Luna, South Linder, South Lotus, and Archer Aves., to D. Cuzzone, 922 South Marshfield Ave. Noted June 26.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Albany Ave., to E. Meluccio, $2,161; Lenox Rd. and Logan to M. Fornara, $3,085 and $5,240 respectively. Grand total $10,485. Noted June 19.

O., Cleveland—For 908 ft. 12- to 15-in. vitr. tile sewer in Edgepark Ave., to Moorhead & Mutillo, 1343 East 120th St., $3,061; 570 ft. 12 in. vitr. tile sewer in Traynor Rd., to F. A. George, 2363 West 14th St., $2,129; 5,935 ft. 12- to 15-in. vitr. tile in concrete, in Warrensville Farm, to Kassouf Constr. Co., Althen Ave., $11,663; 26 ft. 3 ft. C brick sewers in East 65th St., to A. L. Connelly Co., 1900 Euclid Bldg., $4,595. Grand total $21,448.

Ont., Ottawa—City, 8 in. and up sewers at Exhibition Grounds, day labor; pipe, to H. Halley, Hurdmans Rd., Ottawa. Est. $40,000.

WASTE DISPOSAL

PROPOSED WORK

Ont., Hamilton—City Council, concrete, brick, steel garbage incinerator plant. $300,000. W. L. McFaul, city engr.

CONTRACTS AWARDED

N. Y., Cedarhurst—Sanitary Dist. 1, 200 ton incinerator, to Hiler Eng. & Constr. Co., Inc., 122 Livingston St., Brooklyn. Est. $153,000.

BRIDGES

PROPOSED WORK

Ind., Anderson—Madison Co. 5 span 400 ft. steel arch bridge over White River at North Madison Ave. $142,000. M. A. Steele, Anderson, engr.

Mo., St. Louis—City, Missouri Pacific R.R. Co., E. A. Hadley, ch. engr., Missouri Pacific Bldg., and Terminal R.R. Assn. of St. Louis, H. J. Pfeifer, ch. engr., soon take bids reconstructing steel, timber bridge over Mill Creek Valley, 21st St., south of Clark Ave. $50,000.

Mo., St. Louis—City and St. Louis-San Francisco Ry., F. G. Jonah, ch. engr. Frisco Bldg., St. Louis, soon takes bids replacing 3 track steel, concrete bridge with 4 track rein.-con., steel viaduct over Southwest Ave. at Ivanhoe Ave. L. R. Bowen, city engr.

New Jersey — Bd. Freeholders Ocean Co., Court House, Toms River, 2,000 ft. creosote timber bridge, with jackknife draw over Barnegat Bay between Mantoloking and West Mantoloking, $250,000. H. C. Shinn, Municipal Bldg., Lakewood, co. engr.

O., Brecksville—Bd. Comrs. Cuyahoga Co., Cleveland, rein.-con. bridge over Chippewa Creek. $50,000. **Maturity late in fall.** A. M. Felgate, Court House, Cleveland, engr.

O., Cleveland — Bd. Comrs. Cuyahoga Co., rein.-con., steel bridge over Rocky River, on Irish Rd. $100,000. **Maturity in 1931.** A. Felgate, Court House, engr.

Ontario and Quebec—Secretary Dpt. P. Wks., Ottawa, Ont., soon takes bids 400 ft. span bridge between Hawesbury, Ont. and Grenville, Que., for Governments of Ontario and Quebec. $400,000. K. M. Cameron, Ottawa, Ont., engr.

Ont., North Bay—Temiskaming & Northern Ontario Ry.; S. B. Clement, ch. engr., soon takes bids bridge over Moose River in order to extend its line to Moose Factory, James Bay. Noted Mar. 13.

BIDS ASKED

Maryland—July 22, by State Roads Comn., Baltimore, G. C. Uhl, chn., timber bridge exclusive of draw span on Love Point-Queenstown Rd. over Kent Island Narrows, Contr. Q-43-28, Queen Anne's Co.; adv. E. N.-R. July 17. Former bids rejected. Noted June 19.

Michigan—July 24, by H. C. Fleming, resident engr., Grand Rapids, M-Br. 2 of 41-23-11, Contr. 1 and 2, Kent Co., two 50 ft. and six 75 ft. spans, rein.-con. deck girder, steel, with 40 ft. roadway, for State Hy. Comn., Lansing.

Mass., Boston—July 28, by Dpt. P. Wks., reconstructing L Street Bridge between Boston and South Boston. Noted June 19.

N. Y., Auburn—July 22, by J. F. Donovan, city engr., Memorial City Hall, Canoga Street Bridges over Owasco Outlet and Raceway with approaches, incl. building and removal temporary bridges.

N. Y., White Plains—July 28, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, stone faced rein.-con. bridge over Bronx River, County Center, Bronx River Parkway, Contr. 308. J. Downer, Bronxville, ch. engr.; adv. E. N.-R. July 17.

North Carolina—July 29, by State Hy. Comn., Raleigh, rein.-con. bridges, culverts, on Project 6811, Scotland Co., $37,500; Project 3320, Columbus Co., $25,000. J. D. Waldrop, Raleigh, state engr.

O., Cleveland—Aug. 6, by Comrs. Cuyahoga Co., furnishing, erecting 11,700 tons structural steel work on Lorain-Central Bridge. $1,755,000. Wilbur Watson & Associates, 4614 Prospect Ave., engrs.

Oklahoma—July 21, by State Hy. Dpt., Oklahoma City, 1 span 106 ft. steel truss bridge on concrete piers near Caney, $28,000—1 span 120 ft. steel truss bridge on concrete piers at Caney, $30,000—1 span 88 ft. steel truss bridge on concrete piers at Atoka, $27,000, all Atoka Co.—10 span 140 ft. rein.-con. bridge at Ft. Hill, Comanche Co., $35,000—8 span 98 ft. rein.-con. bridge at Temple, Cotton Co., $25,000—17 span 612 ft. I-beam bridge on pile piers at Guymon, Texas Co., $25,000. A. R. Losh, hy. engr.

Rhode Island—July 30, by State Bd. Pub. Roads, State Office Bldg., Providence, State Bridges 260, 261 and 262 F. A. P. 49-B, towns of Richmond and Hopkinton; adv. E. N.-R. July 17.

South Carolina—See "Streets and Roads."

Vt., Bennington—July 22, by Town Bd. Selectmen, Moon, Carrier and Park Street Bridges, concrete, steel. $25,000 or more.

CONTRACTS AWARDED

California—State Hy. Comn., Sacramento, 3 bridges, one over Salt Creek, one over Freshwater Creek, other over Green Valley Slough, all near Williams, Colusa Co., to Frederickson & Watson, 354 Hobert St., Oakland, $18,127. Noted June 12.

Conn., Meriden—State, City and New Haven R.R. Co., c/o J. A. Macdonald, State Hy. Comn., Hartford, concrete, steel bridge, Broad St., to Immick Co., State St. Extension. Est. $42,000.

Illinois — State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bridges in Madison Co., to Frazier-Davis Constr. Co., Arcade Bldg., St. Louis, Mo., $19,069—Whiteside Co., to Rock Island Bridge & Iron Wks., Rock Island, $7,017—Grundy and Kendall Counties, to Jaicks Bros. 77 West Washington St., Chicago, $21,614—Marshall Co., to H. C. Holmes, Macomb, $56,528—Marshall Co., to Mississippi Valley Structural Steel Co., Decatur, $5,330—Ford Co., to McMahan Constr. Co., Rochester, Ind., $174,331—Douglas and Moultrie Counties, to Herrick Constr. Co., Carlinville, $33,416—Alexander Co., to H. H. Hall Constr. Co., Murphy Bldg., East St. Louis, $48,065—Bond and Madison Counties, to Louis Rich Constr. Co., 2038 St. Clair St., East St. Louis, $198,811—McHenry Co., to S. J. Groves & Sons Co., 306 Globe Bldg., Minneapolis, Minn., $10,800—JoDaviess Co., to A. P. Munson, Marion, $14,978—Mason and Cass Counties, to Clinton Bridge Wks., Clinton, $192,000—Macoupin Co., to W. F. Sayer, Jerseyville, $55,064—Macoupin Co., to Mississippi Valley Structural Steel Co., Decatur, $10,813—Fulton Co., to H. C. Holmes, Macomb, $15,761—Marion Co., to Herrick Constr. Co., Marion, $14,883. Grand total $878,480. Noted May 22 under "Streets and Roads."

Ill., Chicago—Dpt. P. Wks., City Hall, North Wabash Avenue Viaduct, 540 ft. long, 116 ft. wide, 400 ft. approaches, steel, rein.-con., to Ketler-Elliott Co., 3101 South California Ave., $529,929. Noted June 12.

Indiana — State Hy. Comn., Indianapolis, three 65 ft. span rein.-con. arch bridge over Middle Fork Creek, Jefferson Co., to H. W. Miller, 5240 Washington Blvd., Indianapolis, $25,194.

Mass., Fitchburg—Dpt. P. Wks., City Hall, granite arch bridge, Kimball St. $35,000. Owner builds. J. M. Pierce, City Hall, engr.

Mass., Groton—Town, G. Pierce, supt. streets, rein.-con. bridge over Squannacock River between Groton Center and West Groton, to Simpson Bros. Corp., 77 Summer St., Boston. Est. $45,000. Noted July 10.

Mich., Grosse Ile—Wayne Co. Rd. Comn., Barlum Bldg., Detroit, rebuilding bridge, incl. found., pier extensions, concrete deck and railings between here and mainland, to A. J. Dupuis Co., 1210 Ford Bldg., Detroit, and Great Lakes Dredge & Dock Co., 104 South Michigan Blvd., Chicago, Ill. Est. $265,000.

North Carolina — State Hy. Comn., Raleigh, rein.-con. bridges on State Project 5990, Rockingham Co., to Austin Bros. Bridge Co., 1199 Mickleberry St. S. W., Atlanta, Ga. $108,695.

North Carolina—State Hy. Comn., Raleigh, rein.-con. bridges, culverts on Project 6496, Mecklenburg Co., to A. L. Berry, Hickory, $32,269; Project 7713, Watauga Co., to Hobbs-Peabody Constr. Co., Charlotte, $27,166. Noted June 5.

Ohio—R. N. Waid, dir. hys., Columbus, 3 span, steel girder bridge and concrete paving same, incl. approaches, Franklin Co., to Middle States Constr. Co., Columbus, $51,831—180 ft. steel truss bridge, with 24 ft. roadway, Logan Co., to E. E. Milligan, Sidney, $34,575—steel truss bridge, Fairfield Co., C. A. Lumsford, Logan, $20,217—extending existing arch span, constructing necessary retaining walls and sidewalks on bridge, Cuyahoga Co., to Highway Constr. Co., 1530 Builders Exch. Bldg., Cleveland, $37,296. Grand total $143,919. Noted June 19.

Pennsylvania—State Hy. Comn., Harrisburg, three 86 ft. span rein.-con. arch bridge, with 30 ft. roadway, 5 ft. sidewalk, 7,528 lin.ft. rein.-con. paving 18 wide, Route 30, Penn Twp., Duncannon Boro, to J. H. Wickersham, Lancaster, $279,889.

Pa., Pittsburgh—Allegheny Co., Court House, Bull Creek Bridge, approaches, near here, to Union Eng. & Constr. Co., Investment Bldg., $41,443. Est. $55,000.

Tex., Amarillo—Atchison, Topeka & Santa Fe Ry. Co., G. W. Harris, ch. engr. system, Chicago, Ill., substructure for 1,736 ft. bridge over Canadian River, 114 ft., above water, incl. 17 piers, to Union Bridge & Constr. Co., 1205 Midland Bldg., Kansas City, Mo. Total est. $1,000,000.

Tex., Corpus Christi — C. E. Cocke, engr., Corpus Christi, 1,700 ft. creosoted timber trestles on new paved and new hys. to Cage Constr. Co., Corpus Christi, for Nueces Co. $37,400. Noted June 19.

Tex., Dallas—Dallas Co., c/o C. E. Gross, aud., 1,800 ft. steel, rein.-con., pile trestle bridge, 24 ft., on Ft. Worth-Irving Rd. in Levee Dist., to Morrison & Coleman, P. O. Box 1335, Fort Worth. Est. $100,000.

Wash., Seattle — S. J. Humes, dir. hys., Olympia, steel superstructure Lake Union Bridge on State Rd. 1, Kings Co., to U. S. Steel Products Co., 1054 4th St. S., $1,247,888. Noted June 5.

STREETS AND ROADS

BIDS ASKED

California — July 30, by State Hy. Comn., Sacramento, grading, untreated crushed gravel or stone surfacing, timber bridges 2 mi. McDonald-Wendling Rd., Mendocino Co.—16.2 mi. Desert Center-Hopkins Well Rd., Riverside Co.—grading, oil treated crushed gravel or stone surfacing 9.5 mi. Dunn-Cronise Valley Rd., San Bernardino Co. — grading, concrete surfacing 1.7 mi. road through Lincoln, Placer Co.—grading 0.4 mi. West Boundary-Burnt Ranch Rd., Trinity Co. C. H. Purcell, P. Wks. Bldg., Sacramento, hy. engr.

Calif., Los Angeles—July 22, by City Council, guttering, waterworks, 4 in. disintegrated granite paving with oiled and screenings 142,500 sq.ft. California Ave., et al.

Calif., Los Angeles—July 28, by Bd. Supervs. Los Angeles Co., grading, curbing, walks, guttering, headwalls, 4 in. disintegrated rock paving and rock oil surface 103,000 sq.ft. County Impvt. 940, Kelburn Ave.

Ill., River Grove — July 21, by Bd. Local Impvts., grading, curbing, rein.-con. paving Wood St., Grand, River Grove, Forest View and Herrick Aves.—also vitr. tile house connection sewers in Hessing and School Sts., Markwood and Fairview Aves., lead pipe water service connections in Forest View and Center Aves., Marwood and Hessing Sts. H. Wienerslage, secy.

Indiana—July 29, at office State Hy. Comn., Indianapolis, grading, culverts Road 162-A, Spencer Co., incl. 15,398 cu.yd. excav., 185 cu.yd. concrete, 12,127 lb. reinforcing, 160 lin.ft. concrete pipe. J. J. Brown, dir.

Ind., Covington — July 21, by Bd. Comrs. Fountain Co., concrete and Kentucky rock asphalt surfacing C. T. Jacobson Rd. $86,143. J. McMurtrie, aud.

Ind., Hartford City—July 22, by Bd. Comrs. Blackford Co., concrete surfacing 3 mi. Stallsmith Rd. $70,000. C. L. Smith, Hartford City, engr.

Ind., Lafayette—July 25, by Bd. Comrs. Tippecanoe Co., concrete surfacing 2.34 mi. South River Rd., 18 ft. $60,000. D. L. McClure Lafayette, engr.

Ind., Valparaiso—July 26, by Bd. Comrs. Porter Co., graveling 2.86 mi. Walter Erickson Rd., $75,939; 1.26 mi. John Pearson Rd., $34,117. C. C. Blachly, Valparaiso, aud.

Ia., Centerville—July 23, by City Clerk, grading, sewers, watermains, curbing, 7 in. rein.-con. paving 8,278 sq.yd. Drake Ave.

Ia., Charles City—July 22, at office Auditor Floyd Co., graveling 19.5 mi. roads. J. S. Dawson, Charles City, co. engr.

Ia., Monticello—July 21, by R. Echternacht, city clk., 800 ft. integral curb, 1,800 cu.yd. excav., 7 in. concrete surfacing 22,000 sq.yd. Howard R. Green Co., 208-10 Bever Bldg., Cedar Rapids, engrs.

Kentucky — July 30, by State Hy. Dpt., Frankfort, retread or bituminous surfacing roads in Group 1, 7.85 mi. Munfordsville-Elizabethtown Rd., S. P. 11-K—8 mi. Mun-

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Streets and Roads (Continued)

fordsville-Bowling Green Rd., S. P. 11-J—2 mi. same road, S. P. 11-J-1, all Hart Co.—Group 2, 6.1 mi. Elizabethtown-Leitchfield Rd., S. P. 12-G-1 and 16.12 mi. Elizabeth-Munfordsville Rd., S. P. 11-L, Hardin Co.—Group 3, 14.416 mi. Owenton-Carrolton Rd., S. P. 59-B—4 mi. Owenton-Gratz Rd., S. P. 19-D—4 mi. Owenton-Sparta Rd., S. P. 64-B—8 mi. same road, S. P. 49-C, all Owen Co.—Group 4, 6.5 mi. Cynthiana-Georgetown Rd., S. P. 58½-B, Harrison Co.—5.5 mi. Georgetown-Williamstown Rd., S. P. 5-F—3.2 mi. Georgetown-Lexington Rd., S. P. 5-G—8 mi. Georgetown-Cynthiana Rd., S. P. 58½-A, all Scott Co.—Group 5, 6 mi. Brooksville-Maysville Rd., S. P. 57-F—11.8 mi. Brooksville-Cynthiana Rd., S. P. 58½-D—10.6 mi. Brooksville-Newport Rd., S. P. 57-E, all Bracken Co.—5.7 mi. Alexandria-Brooksville Rd., S. P. 21½-B-1, Pendleton Co.—Group 6, 5.32 mi. Lexington-Richmond Rd., S. P. 5-1, Fayette Co.—5.4 mi. Richmond-Irvine Rd., S. P. 29-A—4.072 mi. Richmond-Winchester Rd., S. P. 50-A, both Madison Co.—Group 7, 4.55 mi. Danville-Burgin Rd., S. P. 168-A—2 mi. Danville-Lancaster Rd., S. P. 96-A—4.306 mi. Danville-Liberty Rd., S. P. 97-C, all Boyle Co.—5 mi. same Rd., S. P. 96-D, Lincoln Co.—Group 8, 4 mi. Stanford-Somerset Rd., S. P. 22-G, Lincoln Co.—Group 9, 7.05 mi. Mt. Vernon-Berea Rd., S. P. 5-L, Rockcastle Co.—5.643 mi. Richmond-Berea Rd., S. P. 5-K—2.55 mi. Berea-Big Hill Rd., S. P. 207-A, both Madison Co.—Group 10, 13.33 mi. London-Corbin Rd., S. P. 5-O, Laurel Co.—2 mi. Williamsburg-Corbin Rd., S. P. 35-A, Whitley Co. B. Johnson, chn.

Ky., Louisville—July 22, by A. A. Will, dir. P. Wks., City Hall, improving 37 streets. $250,000. A. A. Krieger, city engr.

Maryland—July 22, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete shoulders on 3.31 mi. Contr. AA-771, Anne Arundel Co.—15.1 mi. Contr. P-121-311, Prince George's Co.—sheet asphalt paving 0.57 mi. BC-93-72, Baltimore Co.—concrete sidewalks on 0.7 mi. P-128-311, Prince George's Co.—graveling 2 mi. Contr. SM-69-84, St. Mary's Co.; adv. E. N.-R. July 17.

Md., Towson — July 22, by Comrs. Baltimore Co., Court House, concrete paving 0.84 mi. Group 8. S. A. Green, Courthouse, road engr.

Massachusetts — July 22, by Dpt. P. Wks., State House, Boston, bituminous macadam paving 10,019 ft. hy. in Southwick—1,300 ft. Medway—3,490 ft. Avon—7,231 ft. Revere and Saugus — 2,880 ft. Easthampton — 3,400 ft. Hanover and Pembroke—graveling, bituminous macadam paving 11,689 ft. Winchendon. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Boston—July 22, by Dpt. P. Wks., J. A. Rurke, comr., sheet asphalt or bitulithic paving Marcella and St. Joseph Sts., Ward 11. $25,000.

Mass., Boston—July 21, by Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt or bitulithic paving Fisher Ave. $30,000.

Mass., Medford—See "Contracts Awarded."

Michigan—July 22, by L. N. Jones, resident, engr., Crystal Falls, grading, drainage structures, shaping 7.748 mi. FO36-14C-1, Iron Co., for State Hy. Comn., Lansing.

Michigan—July 22, by R. A. Beers, resident engr., Kalamazoo, grading, concréte paving 3.221 mi. MO11-17C-1, 20 ft., Berrien Co., for State Hy. Comn., Lansing.

Michigan—July 23, by H. C. Fleming, resident engr., Grand Rapids, grading, shaping, 2 course gravel surfacing 3.576 mi. Assessment Dist. 483, Contr. 1, Ionia and Montcalm Counties, 12 ft., for State Hy. Comn., Lansing.

Michigan—July 24, by C. H. Brown, resident engr., Highland Park, grading, shaping, two 20 ft. concrete slab surfacing 2.663 mi. road in Assessment Dist. 474, Contr. 2, Ashland and Wayne Counties, for State Hy. Comn., Lansing.

Mich., White Cloud — July 22, by Comrs. Newaygo Co., 6 in. graveling 1.353 mi., 9 ft. E. W. Larson, White Cloud, co. engr.

Miss., McComb—Aug. 5, by Bd. Selectmen and Mayor, curbing, concrete paving 6,830 sq. yd. H. O. Mentz, Hammond, engr.

Mo., Clayton — July 23, by St. Louis Co. Court, Court House, grading, concrete paving Geyer Rd. from Missouri Pacific R.R. to Big Bend Blvd.—Delmar Ave. from Hanley Rd., to Wellesley Ave.—Ravenwood Ave. from Stratford to Oxford Lane—Julian Ave. from Sutter to Elva Sts. R. Jablonzky, Court House, co. engr.

Mo., St. Louis—July 29, by Bd. P. Serv., City Hall, grading, curbing, guttering, concrete paving Calvary Ave., $120,200—concrete paving 9,225 sq.yd. Chippewa St., $64,280—asphaltic concrete paving East Iowa, West Iowa, South Gasconade, North Gasconade Sts., $33,920 —asphalt paving 1,180 sq.yd. Compton Ave., $7,640. W. W. Horner, city engr.

Nebraska—July 23, by Dpt. P. Wks., R. L. Cochran, state hy. engr., Lincoln, graveling 9.4 mi. F.A.P. 71, Franklin Co.—1.7 mi. S.A.P. 60-K and 222L, Howard Co.—grading 5.6 mi. S.A.P. 627D, Buffalo Co.—bridge at Station 446-45 incl. one 21 ft. span timber trestle or one 20 ft. L-beam, S.P. 639A, Holt Co.

N. J., East Orange—July 28, by City Council, City Hall, grading Fair St., concrete sidewalks 4,624 sq.ft. Hoffman Blvd. and Lindsley Pl. $25,000. E. Willergerod, city engr.

N. J., Long Branch—July 22, by Bd. City Comrs., City Hall, asphaltic road oil on Atlantic Ave. from Liberty St. to Branchport Ave. O. R. Seamon, city engr.; adv. E. N.-R. July 17.

New Mexico—July 28, at office W. C. Davidson, state hy. engr., Santa Fe, grading, bridging, concrete paving, improving 66.826 mi. hys. in Eddy, Guadalupe, Mora, McKinley, Bernalillo and Socorro Counties.

New York — July 29, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, grading 4.7 mi. Mill River Parkway from Saw Mill River Rd., Hawthorne, to King St., Chappaqua, Contr. 300. J. Downer, Bronxville, ch. engr.; adv. E. N.-R. July 17.

New York—Aug. 5, by A. W. Brandt, comr. Hys., Albany, constructing hys. in Cayuga, Jefferson, Saratoga and Monroe Counties—reconstructing hys. in Saratoga, Sullivan Counties—bridges in Greene, Albany, Delaware, Hamilton and Rensselaer Counties; adv. E. N.-R. July 17.

N. Y., Brooklyn—July 23, by H. Hesterberg, pres. Brooklyn Boro, shaping, bituminous concrete paving portions Bay 49th St. East 19th, Ford, East 8th and 29th Sts., Lancaster Ave., Avenue V, Delamare and Mansfield Pls.—permanent asphalt on 6 in. concrete paving Blake, Central, Meserole and Sutter Aves., East 53rd and East 93rd Sts.—permanent Grade 1 granite on 6 in. concrete paving 15th St.

N. Y., Buffalo—July 22, by W. G. Hickman, 29 County Hall, constructing 0.43 mi. Southwestern Blvd. Part 3, CR 205, Hamburg Twp., 30 ft.; asphalt block paving 0.3 mi. Collins Center-Zoar Part 1, CR 40, Collins Twp., 18 ft., for Erie Co. G. Diehl, Ellicott Sq., engr.

N. Y., Haverstraw—July 28, by Bd. Village Trustees, C. M. Fales, clk., improving West St., Riverside Ave., and Long Clove Rd. J. C. Peck, supt. P. Wks.; adv. E. N.-R. July 17.

N. Y., New York—July 21, by J. Miller, pres. Manhattan Boro, Municipal Bldg., grading, curbing, granite block paving Canal St., 7th Ave.; widening, sheet asphalt on concrete paving 7th Ave.

N. Y., St. George—July 23, by J. A. Lynch, pres. Richmond Boro, Boro Hall, concrete curbing, vitr. brick guttering, concrete sidewalks Cromwell Ave.—grading, concrete sidewalks, curbing Richmond Rd.—bituminous macadam paving Morrison Ave.

North Carolina—July 29, by State Hy. Comn., Raleigh, **(S.P. means State Project)** grading, top soiling 16.61 mi. S.P. 6811, Scotland Co. $99,200—11.75 mi. S.P. 3320, Columbus Co. $104,800—grading, concrete or asphaltic concrete paving 8.13 mi. S.P. 6120, $138,100—9.13 mi. S.P. 6131 $154,529, both Anson Co.—14.68 mi. S.P. 2052, Craven Co. $249,000. J. D. Waldrop, Raleigh, engr.

Oklahoma — July 21, by State Hy. Dpt., Oklahoma City, concrete slab surfacing 5 mi. Wilson Rd., U. S. Hy. 70, Carter Co. $100,000—4.3 mi. Mounds Rd., U. S. Hy. 75 $87,000—and 4 mi. Sapulpa Rd., U. S. Hy. 75 $80,000, both Creek Co.—4 mi. Waureka Rd., U. S. Hy. 81 $80,000—3 mi. Stephens Co. line Rd., U. S. Hy. 81 $80,000, both Jefferson Co.—5 mi. Wayne Rd., U. S. Hy. 77 $100,000—6 mi. Purcell Rd., U. S. Hy. 77 $120,000, both McClain Co.—3.5 mi. Muskogee-Ft. Gibson Rd., U. S. Hy. 27 $70,000—3 mi. Boynton Rd., U. S. Hy. 52 $60,000—3 mi. East Boynton Rd., U. S. Hy. 52 $60,000—4 mi. Muskogee Rd., U. S. Hy. 73 $80,000—3 mi. Okaha Rd., U. S. Hy. 73 $60,000, all Muskogee Co.—4 mi. Drumright Rd., State Hy. 33 $80,000—4 mi. Cushing Rd., State Hy. 33 $80,000, both Payne Co.—3 mi. Tecumseh Rd., State Hy. 18 $60,000—3 mi. Pearson Rd., State Hy. 18 $60,000, both Pottawatomie Co.—2.5 mi. Konowa Rd., Hy. 48, Seminole Co. $50,000—asphalt surfacing 5 mi. Isabel Rd., U. S. Hy. 70 $45,000—5 mi. Garvin Rd., U. S. Hy. 70 $45,000, both McCurtain Co.—widening, concrete surfacing 1 mi. Sapulpa Rd., U. S. Hy. 66 Creek Co. $25,000—grading, drainage structures 5 mi. Webber Falls Rd., U. S. Hy. 64 $25,000—5 mi. Warner Rd., U. S. Hy. 64 $25,000, both Muskogee Co. A. R. Losh, hy. engr.

Okla., Chickasha—July 24, by C. A. Chincholl, city clk., grading, curbing, concrete paving 7 blocks Street Impvt. Dist. 49. $35,000.

Okla., Chickasha—July 24, by C. A. Churchall, city clk., grading, paving 6 blocks Colorado St., 30 ft. $26,000. R. O. Bradley, Chickasha, engr.

Okla., Fairview—July 21, by O. T. Corwin, city clk., grading, paving 2 blocks Bway., 76 ft. $25,000. C. A. Jones, Enid, engr.

Pa., Bradford—July 21, by City, S. M. De Gober, mayor, grading, curbing, drainage structures, 11,305 sq.yd. 7 and 9 in. one course concrete paving, 617 sq.yd. relaid vitr. brick paving State Routes 97 and 756, McKean Co. J. H. Quirk, City Hall, engr.

Pa., Phila.—July 22, by Bureau Hys., Dpt. P. Wks., City Hall Annex, Schedule A, grading 11 streets—Schedule B, asphalt paving (assessment work) 2 streets—Schedule C, redressed granite block paving (assessment work) 2 streets—Schedule D, grading and paving (assessment work) 1 street—Schedule E, county road improving 3 roads—Schedule F, asphalt repaving 4 streets—Schedule G, redressed granite block repaving 3 streets.

Pa., Somerset—July 25, by Bd. Comrs. Somerset Co., Court House, E. Duppstadt, clk., surfacing 5 mi. Plank Rd., incl. 4,600 tons amiesite. P. A. Shaffer, Court House, co. engr.

South Carolina—July 29, by State Hy. Comn., Columbia, grading, widening, bridging, concrete paving 34 projects in Abbeville, Allendale, Bamberg, Barnwell, Chesterfield, Colleton, Clarendon, Calhoun, Dorchester, Fairfield, Greenwood, Georgetown, Horry, Kershaw, Lancaster, Lexington, Marlboro, Newberry, Lawrence, Union, McCormick, Saluda, Orangeburg, Williamsburg, and York Counties; adv. E. N.-R. July 17.

Tex., Spearman — July 22, by C. D. Cook, mayor, grading, curbing, guttering, concrete, brick or asphalt paving 12,000 sq.yd. $30,000. Montgomery & Ward, Wichita Falls, engrs.

Vermont—July 18, by State Hy. Comn., State House, Montpelier, rein.-con. paving 1.8 mi. hy. Middlesex and Montpelier. $70,000.

Virginia—July 29, by State Hy. Dpt., Richmond, clearing, grubbing, grading, drainage structures, topsoiling 4.8 mi. Route 19, Project S-622-A, Fluvanna Co.; 487 ft. bridge over Pagan River, Route 10, Project F-191-H, Isle of Wight Co. H. J. Spallman, ch. engr.; adv. E. N.-R. July 17.

W. Va., Wayne—July 25, Wayne Co. Court, at office H. Adkins, clk., gravel, limestone or slag bound surfacing 13,200 lin.ft. Big Sandy Rd. H. O. Wiles, co. road engr.

Wisconsin—July 24, by State and Clark and Dunn Counties Hy. Comns., Eau Claire, grading, concrete paving 3.98 mi. Abbotsford-Dorchester Rd., S.T.H. 13; F. A. P. 147 reopened; tar or asphalt surfacing 1.3 mi. Menomonie-Wheeler Rd., S.T.H., 25, State A. P. 6106.

Ont., Hamilton—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Los Angeles—Los Angeles Co., grading, curbing, guttering, walks, concrete paving Anaheim-Telegraph Rd., to Griffith Co., Railway Bldg., $118,970.

Calif., San Clemente—Grading, curbing, concrete paving 8,326 sq.yd. El Camino Real, to Griffith Co., Railway Bldg., Los Angeles, $152,562.

Idaho—Commissioner P. Wks., Boise, grading 0.316 mi. Sawtooth Park Hy., Lincoln Co., to D. Knight, Gooding, $4,777—0.177 mi. Indiana Creek Bridge, approaches, to R. F. Nichol, Vale, Ore., $3,911—graveling 3.589 mi. Thomas Fork Bridge, Bear Lake Co., to Robinson Constr. Co., Twin Falls, $52,989—4.808 mi. North Side Hy., Jerome Co., to Sutherland & Burns, Missoula, Mont., $21,598. Grand total $83,275.

Idaho—At office J. D. Wood, comr. P. Wks., Boise, grading, crushed rock surfacing 7.418 mi. Washington Co., to Idaho Contg. Co., Boise, $48,732—grading 3.617 mi. Custer Co., to W. Hoops, Twin Falls, $25,479—crushed rock surfacing 5 mi., Adams Co., to Triangle Constr. Co., 1220 Ide St., Spokane, Wash., $9,825. Grand total $84,036. Noted June 19.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, to H. V. Pipp, Mt. Carmel, graveling roads in Madison Co., $10,260—to Cameron, Joyce & Co., Keokuk, Ia., Peoria Co. $26,793—to M. Hays & Sons, 209 South La Salle St., Chicago, paving Knox Co. $5,732—to Birt Bros., Decatur, Sect. 44-K $23,416; Sect. 45-K $4,201; Sect. 48-K $6,891, all Route 8, Knox Co.—to R. McCalman, Danville, Morgan Co. $5,038—to C. J. Moritz, Inc., Effingham, Wayne Co. $39,805—to Hurden Constr. Co., Janssen Bldg., Springfield, Sangamon Co. $9,312—to Hartmann-Clark Bros., Peoria Life Bldg., Peoria, Peoria Co. $10,210—to R. P. Devine, Watseka, Fulton and Schuyler Counties $80,007—to Jaicks Bros., 77 West Washington St., Chicago, Kane Co. $146,244—to E. M. Rocho, 309 Second Natl. Bank Bldg., Freeport, Stephenson Co. $145,221—to L. B. Dyer, Hoopston, Marshall Co., $48,272; Woodford, Hancock and Schuyler Counties, $79,783; Schuyler Co., $6,414—to Trompeter & Sons, Peru, Grundy and Kendall Counties, $153,838; Woodford Co. $89,550—to P. Simons, Quincy, Schuyler Co., $156,405—to McMahon Constr. Co., Rochester, Ind., Ford Co. $146,957—to J. C. O'Connor & Sons, Ft. Wayne, Ind., Douglas and Moultrie Counties, $149,835—to Harrison Eng. Co., 506 Mutual Bldg., Kansas City, Mo., McHenry Co. $294,889—to Breeden Bros., Constr. Co., Springfield, Marion Co. $17,320—to J. W. Etchison, Casey, Montgomery Co. $67,033—to Dungey & Cochran, Marion, Saline Co., $27,355; Jackson Co. $12,117; Saline and Gallatin Counties, $153,138—to W. Lough, Marion, Route 150, Sect. 118 Randolph Co. $64,338; Sect. 119 $187,226—to C. E. Giertz, Elgin, Route 5, Sect. 5Z, Dupage Co. $104,818; Sect. 6Y $99,394—to States Impvt. Co., 160 North La Salle St. Chicago, Cook Co. $87,680—to H. Mayes & Sons, Chicago, Fulton Co. $288,114—to Cast Stone Constr. Co., Bloomington, Morgan Co. $129,560—to Pickus Eng. & Constr. Co., 416 North Michigan Ave., Chicago, Cook Co. $79,234—to H. V. Pipp Co., Mt. Carmel, grading Macoupin Co. $46,957—to Clark-Kearney-Stark, Louisiana, Johnson Co. $170,193, Mason and Cass Counties $139,251—to Central Eng. Co., Putnam Bldg., Davenport, Henry Co. $105,108—to Kruger & Posey, Elkhorn, Wis., Jo. Daviess Co. $92,635. Grand total $3,410,544. Noted May 22.

Ill., Belleville—Concrete paving North Church St., to A. P. Poirot, 721 East Washington St., $53,287; grading, concrete paving North 17th St., and Fulton Street Sewer, to Hoeffken Bros. Constr. Co., 222 West B St., $20,851 and $9,669 respectively. Grand total $83,807. Noted Apr. 17.

Indiana—State Hy. Comn., Indianapolis, improving 0.234 mi. Ft. Wayne-Elkhart Rd., Allen Co., to C. D. Coil, Ft. Wayne, $8,948 est. $13,327; 0.934 mi. Warsaw-Goshen Gap Rd., Kosciusko Co., to McClintock-Colwell & Gordy, Syracuse, $13,321 est. $18,114.

Ind., Anderson—Madison Co., curbing, concrete surfacing 1 mi. Avery Rd., 30 ft., to Daniels & McVaugh, Anderson, $30,988. Est. $33,000. Noted June 12.

Streets and Roads (Continued)

Ind., Indianapolis — Marion Co., grading, 4 bridges, guard rail, ditching, resetting catch basins, concrete surfacing 63,674 sq.yd. West 10th St., to McCoun Constr. Co., Noblesville, $135,269. Est. $189,904. Noted June 3.

Ind., Indianapolis — Bd. Comrs. Marion Co., Court House, grading, concrete surfacing 46,089 sq.yd. 71st St., incl. 3 bridges, to McNamara Constr. Co., 946 West New York St., $95,993. Est. $129,725. Noted June 12.

Ia., Garner—Hancock Co. graveling 29 mi. trunk roads, to F. Radosevich, Slater, $15,205. Noted June 19.

Ia., Mason City—Cerro Gordo Co., graveling 18 mi. Dists. 27, 28 and 29, incl. 80 ft. truss bridge on concrete abutments, to C. Thomas, Shell Rock, $15,554. Noted June 12.

Ia., Ottumwa—Wapello Co., improving County Trunk Project 1, incl. 123,913 cu.yd. earth excav., 113,349 cu.yd. overhaul, to McGuire Bros., Forest City, $31,386.

Kan., Ottawa — Franklin Co., grading, surfacing 9 mi. Rantoul-Princeton Cemetery Rd., to A. L. Cook, Ottawa, $58,319.

Kan., Topeka—Grading, 6 and 8 in. concrete paving 29,824 sq.yd., to C. A. Ritchie, 1600 McVicar St., Topeka, $118,000. Noted July 3.

Ky., Louisville — Asphalt paving 13th St. from Oak St. to Magnolia Ave., to Andrews-Collings Asphalt Co., 13th and St. Louis Sts., $31,000.

La., Tallulah—Grading, curbing, guttering, concrete paving Depot and Mulberry Sts., to Merrill Eng. Co., Jackson, Miss., $28,300 cash or $35,374 certificates.

Maryland — State Roads Comn., Baltimore, concrete paving 1.16 mi. Belfast Rd., Group 6, Baltimore Co., to Mahoney Bros., 1111 Rutland Ave., Baltimore, $28,003 — concrete shoulders on 0.94 mi. Contr. M-153-311 Montgomery Co., to Jarboe & Haughton, Mechanicsville, $6,765 —graveling 1.5 mi. Contr. Ch-91-84, Charles Co., to Southern Maryland Contg. Co., 20 East Lexington St., Baltimore, $9,274. Grand total $44,042. Noted June 20.

Maryland—State Rd. Comn., Baltimore, concrete paving 1.77 mi. Contr. H-77-43, Harford Co., to Development & Constr. Co., American Bldg., Baltimore, $65,974. Noted May 29.

Massachusetts—Dpt. P. Wks., Boston, bituminous macadam paving 4,537 ft. hy. in Marlborough, to T. J. Kelly, 31 Round Hill St., Jamaica Plain, $22,564—14,068 ft. Boxford and Topsfield, to J. E. Watkins Co., 10 Fern Ave., Amesbury, $71,760—5,947 ft. Whately, to Kelleher Corp., Turners Falls, $21,693—3,800 ft. Gardner and 5,750 ft. Norton, to G. Bonazzoli & Sons, Hudson, $17,403 and $30,642 respectively. Grand total $164,062.

Massachusetts—Dpt. P. Wks., Boston, bituminous macadam paving 2,750 ft. hy. Danvers, to E. W. Burr, 1601 Hancock St., Quincy, $12,786—2,880 ft. Easthampton ,to Warner Bros. & Goodwin, Sunderland, $22,829—11,075 ft. Chicopee and Springfield, to Waterbury Road Constr. Co., 983 Main St., Hartford, Conn., $64,288 — gravel and bituminous macadam paving 15,300 ft. Ayer, to A. Pallotto, Dracut; $27,736. Grand total $127,639. Noted June 26.

Massachusetts—Dpt. P. Wks., Boston, rein.-con., recut granite block paving 4,935 ft. hy. Stoneham, to G. Rotundi, 199 Laurel St., Melrose, $81,684. Noted June 19.

Mass., Boston—Dpt. P. Wks., bitulithic paving Liverpool St., Ward 1, to B. F. Hanrahan, 26 Bennington St., East Boston, $26,085; Albany St., Ward 8, to A. Singarella, 24 Tremblett St., Dorchester, $21,506. Noted June 26.

Mass., Boston—Sheet Asphalt paving Eustis St., Wards 8 and 12, to C. Struzziery, 115 Kittredge St., West Roxbury $26,490; bitulithic paving Cummins Hy., Ward 18, to M. DeMatteo, 14 Rowe Pl., Roslindale $31,278. Noted July 3.

Mass., Brighton (sta. Boston)—City of Boston, Dpt. School Buildings, grading, fencing, about high school, to Rugo Constr. Co., 80 Boylston St., Boston, $78,000.

Mass., Medford—Dpt. P. Wks., constructing new and reconstructing old roads, separate contracts. $200,000.

Minn., Duluth—S. Shepard, engr., St. Louis Co., grading, concrete paving 6.3 mi. hy. in Hibbing, to E. W. Coons, Hibbing, $151,678. Noted June 12.

Minn., Gaylord—R. F. Borchert, village clk., grading, paving 9,458 sq.yd. State Trunk Hy. 22, to Hanlon & Okes, 1501 Merchants Natl. Bank Bldg., St. Paul $34,420; 1,655 lin.ft. 12 and 15 in. vitr. clay sewers, to H. H. Frankamp, Mankato $2,292.

Mo., St. Louis — Bd. Pub. Serv., vibrolithic concrete paving 3,600 sq.yd. Wall St. and grading, concrete paving alley in City Block 5397, to Kesl-Lonergan Co., 4829 Easton Ave., $13,880 and $4,720 respectively—asphalt paving 1,100 sq.yd. Euclid Ave., to C. A. Moreno Co. Syndicate Trust Bldg., $4,877—grading concrete paving alleys in City Blocks 5430, 5494 and 5642, to Skrainka Constr. Co., Security Bldg., $10,040—alley in City Block 4,819, to Ansbro & Maguire, Title Guaranty Bldg., $5,502—alleys in City Blocks 5313S and 5817, to Alfred Lewald, Inc., 6025 West Cabanne Ave., $6,483—alley in City Block 5456, to F. Weber, Jr., 4034 Bates St., $1,219. Grand total $46,721. Noted June 12.

Neb., Omaha—J. P. Hoctor, city clk., art stone on concrete paving 27,263 sq.yd. Saddle Creek Rd., Dists. 3406 and 3407, to John Kerns Constr. Co., 210 Bankers Reserve Life Bldg., at $2.40 per sq.yd. Noted June 19.

New Hampshire—State Hy. Dpt., Concord, 7 in. one course rein.-con. on 8 in. gravel base course paving 38,936 sq.yd. South Side Rd., Exeter, to A. Susi & Co., Roslindale, $140,497. Est. $150,000. Noted June 19.

N. J., Bergenfield—Bd. Boro Council, Boro Hall, curbing, sidewalks, 6 in. concrete paving West Clinton and Westside Aves., to G. DiNapoli, Inc., 80 Main St., Hackensack, at $2.25 per sq.yd. Est. $25,000.

N. J., Maywood — Bd. Boro Council, Boro Hall, grading, concrete curbing Passaic St., to J. Kinzley Co., Zabriskee St., Hackensack. Est. $36,000.

N. J., Newton — Sussex Co., Court House, grading, bituminous macadam paving Lake Lackawanna Rd., to J. Kinzley Co., Zabriskie St., Hackensack, $21,487—Swartswood-Myrtle Grove Rd., to Taveniere & Johnsen, Herbert Ave., Closter, $9,642 — Stillwater-Middleville Rd., to Gallagher & Cosine, 174 16th Ave., Paterson, $10,865. Grand total $41,934. Noted June 12.

N. J., Somerville—Somerset Co., Court House, rein.-con. paving Stockton Boro Rd., to Thompson & Drumus, Whitehouse, $41,080.

N. J., Somerville—Bd. Freeholders Somerset Co., Court House, rein.-con. paving Califon-Pottersville Rd., to Davenport Eng. & Constr. Co., 386 Crosby Ave., Paterson, $57,151. Est. $75,000.

N. M., Clovis—Asphalt rock paving 54,000 sq.yd., to J. W. Zempter & Co., 65th and J Sts., Galveston, Tex.

N. Y., Albany—Bd. Water Supply, waterbound macadam paving 1.5 mi. hy. in town of Coeymans, to Kent Constr. Co., Albany, $87,891.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, asphalt paving Hoyt and Joralemon Sts., to Cranford Co., 52 9th St., $36,686 and $14,961 respectively—Huron St., to Car Block Paving Co., Stagg St., $6,104—Rockaway Ave., to Brooklyn Alcatraz Paving Co., 407 Hamilton Ave., $23,694—Ryer St., to D. J. McCoy Asphalt Paving Co., Avenue U and East 57th St., $7,162—Sterling Pl. and 23rd Ave., to B. Turecamo Contg. Co., New Cropsey Lane, $34,914 and $3,311 respectively. Grand total $10,486. Noted June 19.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to Guimont Contg. Co., bituminous macadam paving West Ave., $8,293 —to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., asphalt block paving 60th St., $16,060; asphalt paving Colonial Rd., $12,299; 4th St., $13,687; 49th St., $14,318 — to B. Turecamo Contg. Co., New Cropsey Lane, Cropsey Ave., $15,659 — to Carbloc Paving Co., Stagg St., Miller Ave., $22,765; South 4th St., $15,041—to J. D. McCoy Asphalt Paving Co., Avenue U and East 57th St., North 1st St., $6,354; Avenue P, $13,775—to P. J. Doyle, grading Ashford Pl. $3,554—to Heapy Constr. Co., Belmont Ave., $2,953; Flatlands Ave. $9,542—to J. and M. Moran Excavating Co., 413 Sterling Pl., Georgia Ave. $3,088—to W. J. McHale Contg. Co., 1250 Jefferson Ave., Hendrix St., $4,333—to Concrete Co., Metropolitan Ave., Avenue L, $3,165; East 56th St., $3,728; Remsen St., $2,384—to Castle Bros., Johnson Pl., East 45th St., $3,190. Grand total $174,188.

N. Y., New York—Dpt. Plant & Structures, Municipal Bldg., approach to upper roadway Queensboro Bridge, Manhattan Boro, to A. I. Kraft, Inc., 1560 Bway., $182,964.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., grading, granite block paving, to Sicilian Asphalt Co., 41 Park Row, $436,700; asphalt paving Park Ave., to Meehan Paving & Constr. Co., 90 West St., $208,950; test piles, footings, loading tests, to A. I. Kraft, 1560 Bway., $37,951. Grand total $683,601. Noted June 26.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, concrete paving Richmond Ave. and Amboy Rd., to Vanbro Constr. Co., 24 Elizabeth St., West New Brighton, $113,694 and $6,118 respectively. Noted June 26.

North Carolina — State Hy. Comn., Raleigh, grading, sand asphalt paving 5.38 mi. S.P. 3-5, Bladen Co., to Blythe Bros., Charlotte $81,303—grading, concrete paving 10 mi. S.P. 1830, Pitt Co., to Roberts Paving Co., Salisbury, Md., $202,202.

North Carolina—State Hy. Comn., Raleigh, to N. L. Teer, Durham, grading, crushed stone surfacing 2.87 mi. Project 7715, $25,735; clearing, grubbing, grading, 9.35 mi. Project 7713, $80,170, both Watauga Co.; grading, crushed stone surfacing 6.29 mi. Wilkes Co., $67,760—to North Carolina State Prison Bd., Raleigh, crushed stone surfacing 6.34 mi. Person Co., $33,695—to Powell Paving Co., Winston-Salem, grading, concrete paving 6.14 mi. Forsyth Co., $122,887—to G. R. Martin, Salisbury, grading, clearing, concrete paving 7.62 mi. Mecklenburg Co., $166,151—clearing, grading, topsoiling 8.23 mi. Union Co., to Beal Bros., Bear Creek, $39,060—to West Constr. Co., Chattanooga, Tenn., grading, sand asphalt paving 5.67 mi. Onslow Co., $77,796. Grand total $613,254. Noted June 5.

Ohio—R. N. Waid, dir. hys., Columbus, concrete paving 2.34 mi. hy. Fulton Co., to McKechnie-Pierce Co., Nicholas Bldg., Toledo, $70,888—0.429 mi. hy. same county, to G. L. LaBoiteaux, 4926 Lewis St., Toledo, $12,223—10.726 mi. Darke Co., to Manix Bros., Greenville, $251,005 — 1.701 mi. Ottawa Co., to Peters Bros., 729 Ewing St., Toledo, $43,760—1.263 mi. Henry Co., to Lander & Sons, 232 Vine St., Toledo, $28,980—2.19 mi. Gallia Co., to S. A. Baxter Co., Toledo, $79,528—6.965 mi. Putnam Co., to J. J. J. Stambaugh, Ada, $169,191—7.499 mi. Wood Co., to S. E. Johnson Co., Lasky Rd., Toledo, $287,298—3.813 mi. Tuscawaras and Harrison Counties, to W. L. Johnson Constr. Co., Hicksville, $177,458 — 0.7143 mi. Hamilton Co., to Andrews Asphalt Paving Co., Hamilton, $44,787 — 3.032 mi. Wayne Co., to Columbus Asphalt Paving Co., Buckeye Bldg., Akron, $59,390—4.295 mi. Union Co., to Davis & Davenport Constr. Co., Spencerville, $124,474—0.587 mi. Fulton Co., to F. E. Bell & Son, Findlay, $20,364—traffic bound macadam paving 3.45 mi. Stark Co., to J. H. Holub Constr. Co., Akron, $68,544—0.553 mi. Fairfield Co., to C. A. Lumsford, Logan, $8,593—0.397 mi. Morgan Co., to C. G. Dodd, Spencer, W. Va., $14,689—2.512 mi. Trumbull Co., to C. A. White Constr. Co., Willoughby, $36,000—1.884 mi. Athens and Meigs Counties, to I. J. Kuhner, Jackson, $72,043—1.033 mi. Muskingum Co., to E. L. Paul, Zanesville, $66,343—brick paving, incl. furnishing, delivering brick, 5.218 mi. Stark Co., to E. O. Vogt Paving Co., Massillon, $246,329 — 0.231 mi. hy. same county, to Garaux Bros., Canton, $46,912 —4.152 mi. Montgomery Co., to J. Wroe, Inc., Dayton, $149,883—1.869 mi. Mahoning Co., to McCourt Constr. Co., 369 South Main St., Akron, $79,964—0.39 mi. Pickaway Co., to A. W. Burns Constr. Co., 424 Woodland Ave., Columbus, $49,776—0.3835 mi. Cuyahoga Co., and brick paving 0.927 mi. hy. same county, to Highway Constr. Co., 1530 Builders Exch. Bldg., Cleveland, $65,721 and $34,529 respectively—1.02 mi. Ross Co., to Brewer & Brewer Sons, Chillicothe, $43,645—2.605 mi. Ross Co., to H. D. Watters, Columbus, $337,950—limestone and oil surface treating 11.6 mi. Marion Co., to United States Constr. Co., Upper Sandusky, $8,604—brick paving not incl. brick 2.36 mi. Cuyahoga Co., to F. W. Stolfus, Cleveland, $201,318, furnishing, delivering brick on same project, to Baldwin Bros., Union Trust Bldg., Cleveland, $64,681—bituminous surface treating roads in Miami Co., and 14.28 mi. Belmont Co., to H. W. Curry & Co., Eaton, $19,396 and $14,544 respectively—21.1 mi. Logan Co., to D. C. Ingold, McComb, $17,893—7.5 mi. Williams Co., to Highway Materials Co., Toledo, $24,030—14.4 mi. Clark Co., to L. Dehmer, Tiffin, $14,637—paving, constructing retaining wall, 0.2737 mi. Hamilton Co., to W. C. Iliff, Cedarville, $43,298—grading, draining 5.222 mi. Jefferson Co., to Ross & Ritchie, Ravenswood, W. Va., $272,105—grading, drainage structures, placing stone on sub-grade 5.12 mi. Scioto Co., to Frowine Bros., Portsmouth, $59,560—traffic bound gravel paving 0.768 mi. Knox Co., to L. D. Kear, Wharton, $37,539—bituminous macadam paving 2.156 mi. Mahoning Co., to E. E. Miller & Son, Canfield, $54,135—0.2 mi. Trumbull Co., to H. L. Sharp & Co., Parkman, $8,969—0.482 mi. Jefferson Co., to A. Murphy, Mingo Junction, $32,145—graveling 7.741 mi. Clark Co., to Bish & Carey, Ada, $96,730—6.25 mi. Belmont Co., to R. Strawser, East Columbus, $14,725. Grand total $3,674,576. Rejected bids June 24, grading, draining, concrete paving 5.459 mi. Madison Co., $155,712—bituminous macadam or concrete paving 4.83 mi. Trumbull Co., $177,816 or $186,995 respectively—paving 4.064 mi. Fayette Co., $104,524 —brick paving, incl. furnishing, delivering brick 3.091 mi. Adams Co. $129,500. Noted June 19.

O., Akron—F. E. Swineford—Dir. Dpt. P. Serv., widening, repressed brick paving Merriman Rd., to McAlonan Bros., Akron, $5,003; South High St., also widening, sewers, Mexican sheet asphalt paving Brown St. and Wilbeth Rd., to T. E. McShaffery Constr. Co., 173 South Forge St., $60,595 and $7,357 respectively. Grand total $72,955. Noted June 26.

O., Cleveland—Asphalt paving 750 sq.yd. Superior Ave., and curbing, brick paving 1,570 sq.yd. Upton Ave., to Gould & Maybach, 16311 Saranec Rd., $5,202 and $8,467 respectively—curbing, brick paving 3,030 sq.yd. Valley Rd., to Baldwin Bros., Union Trst Bldg., $49,762—1,285 sq.yd. Vandalia Ave., to W. E. McHugh West 73rd St. and Wheeling & Lake Erie R.R. tracks, $6,636—1,050 sq.yd. East 140th St., to Cleveland Trinidad Paving Co., The Arcade, $7,204—curbing, concrete paving 860 sq.yd. East 94th St., to Rieley Bros., The Arcade, $5,742. Grand total $83,013. Noted June 26.

Okla., Tulsa—Grading, paving 20 blocks Riverside Dr., 40 ft., to Roy Tanner Paving Co., Nebraska Bldg., $73,829 est. $80,000; 17 blocks 31st St., 36 ft., to Highway Constr. Co., Daniels Bldg., $56,250 est. $65,000.

Okla., Wewoka—Seminole Co. grading, drainage structures 9.885 mi. Projects 43 and 44-A, to J. J. Harrison, Wewoka, $36,777. Noted June 5.

Okla., Wewoka — Seminole Co., grading, drainage structures 8.064 mi. County Road 47, 30 ft., to J. S. Wade, Edmond, $49,933. Est. $52,000.

Oregon—State Hy. Comn., Salem, grading, paving Sandy Co., to Jacobson Jenson, 407 Stanton St., Portland, $182,840—9.3 mi. Washington Co., to J. A. Lyons, 1001 Halsey St., Portland, $112,410—broken stone surfacing 10.1 mi. Lincoln Co., to Newport Constr. Co., Exchange Bldg., Portland, $143,310—18 mi. Wheeler Co., to Milnr & Dessault, 185 East Bway., Portland, $125,672—Lane Co., to L. D. Packard, Blatchley, $33,495—grading 1.29 mi. Coos Co., to Joplin & Eldron, Crouch Bldg., Portland, $32,170—7.9 mi. Union Co., to Union Constr. Co., Union, $41,218. Grand total $671,115.

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Streets and Roads (Continued)

Pennsylvania—State Hy. Comn., Harrisburg, grading 92,800 cu.yd. York Co., to Deline & Elmes, Long Island City, N. Y., $91,200—grading, 7 and 9 in. rein.-con. surfacing 13,800 sq.yd. Norsham Twp. and 22,009 sq.yd. White Marsh Twp., Montgomery Co., to Dalton Bros., Paoli, $58,111 and $110,503 respectively—12,200 sq.yd. Westmoreland Co., to Mt. Pleasant Constr. Co., Mt. Pleasant, $78,373—19,600 sq.yd. Jefferson Co., to Paul Constr. Co., Cresson, $99,647—22,850 sq.yd. Greene Co., to Tri State Eng. Co., Cumberland, Md., $169,120—3,902 sq.yd. York Co., to P. R. Hostetter, Inc., York, $13,647—grading, rein.-con. surfacing 28,380 sq.yd., bituminous surface treated macadam surfacing 4,000 sq.yd. Green Co., to F. F. Hallam & Son, Washington, $263,754—grading, bituminous surface treated macadam surfacing 18,536 sq.yd. Cumberland Co., to York Eng. & Constr. Co., York, $46,340—13,144 sq.yd. Pike Co., to Sweeney Bros., Scranton, $40,299—88,368 sq.yd. Snyder Co., to J. J. Allen, Mannington, W. Va., $150,171—10,760 sq.yd. Cameron Co., to Central Penna Constr. Co., St. Marys, $52,416. Grand total $1,173,581. Also awarded grading, concrete surfacing 41,200 sq.yd. Venango Co., to Hagadorn Constr. Co. Noted June 12.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, concrete surfacing 43,200 sq.yd. Application 7181, Bradford Twp., to McHugh Bros., Indiana, $197,062; 50,500 sq.yd. Route 29, Brown and Armagh Twps., Mifflin Co., to Burket Constr. Co., Vineland, N. J., $250,909. Noted June 12.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, concrete surfacing 17,500 sq.yd. Route 109, Norwegian and Branch Twps., Schuylkill Co., to W. Grant Raub, Red Lion, $158,153. Noted May 15 and 22.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, concrete surfacing 27,103 sq.yd. Route 130, Delaware Co., to Union Paving Co., 315 Butler Ave., Phila., $151,315 — 5,386 sq.yd. Berks Co., to De Paul Constr. Co., Phila., $21,736—45,000 sq.yd. Westmoreland Co., to R. Hopkins, Albany, N. Y., $224,064. Grand total $397,115. Noted May 8.

Pa., Altoona—One course rein.-con. paving 7,002 lin.ft. 6th Ave., 30 ft. wide and grading, paving 5,042 sq.yd. 10 streets, to E. L. Grannis, 1911 5th Ave., $77,246 and $46,785 respectively. Noted June 19.

Pa., Indiana—Indiana Co., hauling, spreading slag from railroad siding at Moose Creek 1, 10,560 ft. from Route 262 on Commodore Purchase Line Station Rd., 24 ft., to Summit Coal & Coke Co., Hollidaysburg.

Pa., Munhall—Boro Council, concrete paving 29 streets, to McCrady-Rogers Co., Homestead, $290,000.

Pa., Phila.—Bureau Hys. Dpt. P. Wks., City Hall, A. Murdock, dir., grading Battersby and Rockland Sts., to Marino Masse, 3936 North Reese St., $1,786 and $2,023 respectively—repressed granite block paving Front St., to United Paving Co., Widener Bldg., $29,369—24th St. and asphalt resurfacing by heater method Group 18, to Union Paving Co., Broad and Philadelphia Sts., $10,271 and $13,179 respectively—fabricated structural steel for east truss of City Avenue Bridge 3 over Schuylkill River, to McHugh-Lucas Co., 20 South 15th St., $915. Grand total $57,543. Noted June 26.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir. to Morissey Bros., 4336 North Marshall St., grading Anderson St. $2,324; Brinton, Duval, Johnson and Pomona Sts. $6,429; Lincoln St. $3,054—to T. P. Lee, 5629 Cherry St., Elmwood and Wheeler Sts. $4,824; Rhoads St. $6,318—to Municipal Constr. Co., Washington Square Bldg., asphalt paving (assessment work) Cherokee St. $3,695; McPherson St. $3,462; vitr. block and asphalt paving (assessment work) Coulter St. $15,035, redressed granite block repaving track area of Woodland St. $15,609—to Elkins Paving & Constr. Co., 836 North Holley St., vitr. block and asphalt paving (assessment work) Calumet St. $8,738—to Union Paving Co., Broad and Philadelphia Sts., asphalt repaving Belgrade St. $11,346; redressed granite block repaving track area Spring Garden St. $6,572; asphalt resurfacing by heater method Group 10 $15,609; Group 11 $17,681, Group 12 $17,225, Group 13 $16,482; Group 14 $15,254, Group 15 $15,414, Group 16 $17,250, Group 17 $12,628— to Eastern Asphalt Co., Penna Bldg., asphalt paving (assessment work) D St., $3,695, asphalt repaving Dauphin St. $20,557, 43rd St. $13,338—to United Paving Co., Widener Bldg., redressed granite block repaving track area Allegheny St. $3,381, Somerset St. $22,372; track area Somerset St. $19,664—to Vincent Jaffolla, Penna. Bldg., sewers and water pipe in Passyunk Ave. $16,627—to Atlas Paving Co., 317 South 7th St., improving, repaving Densale Ave. $24,938, paving, repaving alleys in 1st Highway Dist. $25,636. Grand total $365,157. Noted June 19.

South Carolina—State Hy. Dpt., Columbia (**P. means Project**), to Jamison Bros., Nashville, Tenn., improving P. 294-A, Cherokee Co., $40,204; P. 714-A and B, Chesterfield Co., $150,535; P. 298, Laurens Co., $75,143—to Small & Triplett, Bethune, P. 291-E, Chesterfield Co., $56,566—to Claussen-Lawrence Constr. Co., 1394 Gwinnett St., Augusta, Ga., P. 230-B, Ext., Edgefield Co., $3,325—to Wannamaker & Wells, Orangeburg, P. 238, reopened, Lee Co., $7,384—to George A. Thomason & Co., Macon, Ga., P. 633-B, Spartanburg Co., $27,096—to D. M. Rickenbaker, Union, P. 742, Clarendon Co., $34,345—to R. M. Mitchum, Augusta, Ga., P. 37-A, reopened, $5,767; and P. 522, reopened, $19,309, both Aiken Co. — to H. M. Taylor, Ridgeland, P. 686, Contr. 2 and P. 686-B, Berkeley Co., $29,023—to Newell Contg. Co., Greenville, P. 126, reopened, and P. 531, Fairfield Co., $38,845—to Wilson Constr. Co., Asheville, N. C., P. 759, Fairfield Co., $65,005—to Smith & Bradfield, Macon, Ga., P. 744-A, McCormick Co., $72,283—to Harrison-Wright Co., Charlotte, N. C., P. 620-B, reopened, and P. 747, Newberry Co., $41,835—to S. M. Cooper & Son, Ninety-Six, P. 688, Newberry Co., $28,444—to C. M. Lyle Constr. Co., Gainesville, Ga., P. 640-B, Oconee Co., $76,649—to Carroll-Suber Constr. Co., Newberry, P. 738-B, Union Co., $53,048—to Sanford & Brooks Co., Charleston, P. 296 and P. 741, Williamsburg Co., $94,711—to A. S. Barron, Lancaster, P. 689-A and B, Lancaster Co., $61,364—to R. G. Kennedy, Batesburg, P. 790, Aiken Co., $24,026 — to Florida Bridge & Constr. Co., Orlando, Fla., P. 585, Barnwell and Orangeburg Counties, $20,141; P. 764, Horry Co., $10,677 — to Richardson Constr. Co., Charleston, P. 80, reopened, Sect. 2 and P. 742-B, Clarendon and Williamsburg Counties, $43,511 — to Carolina Road Surfacing Co., Greenville, P. 235-G-A-C-E, Contr. 2, and P. 553, 646-A-B-C and P. 759, Contr. 2, Chester-Fairfield Counties, $234,148; P. 555, Contr. 2, Lancaster Co., $41,262; P. 640-A, Contr. 2, Oconee Co., $59,121; Project 589-B-C-D-E, Contr. 2, Orangeburg and Bamberg Counties, $95,788—to C. G. Fuller, Barnwell, P. (587-574), Contr. 2, Bamberg, Colleton and Hampton Counties, $228,519—to MacDougald Constr. Co., Atlanta, 289½ Peachtree St. N. E., Ga.; P. 516, Contr. 2, Saluda Co., $67,607; and P. 520 and P. 592, Contr. 2, Lexington, Saluda and Newberry Counties, $74,245. Grand total $1,879,926. Rejected bids June 24, improving Project 195-D, Greenwood-Laurens Co. and P. 312 Oconee Co. Noted June 12.

Tenn., Memphis—City Comn., paving Madison Ave., to Carey-Reed Co., 575 North Front St., $121,197; Vance Ave., to Hogan Constr. Co., foot Auction St., $87,545.

Tex., Beaumont—For 1 in. rock asphalt on concrete paving Angelina, 4th, Oakes, Rusk Sts., to Scott Shambough, 1401 Dowling St., Houston, $109,771.

Tex., Longview — Brick, concrete paving, to F. P. McElwreath, Corsicana, $139,328.

Tex., McLean—For 2½ in. brick paving 10,500 yd., to Asplund Constr. Co., Enid, Okla., $29,454.

Tex., Perryton—Brick on caliche paving, to L. H. Lacy Co., 2632 Swiss St., Dallas, $189,000.

Virginia—State Hy. Dpt., Richmond, 8 in. one course macadam surfacing 2,378 mi. roads in Clarke Co., to Poffinberger & Mause, Myersville, Md., $62,889—grading, drainage structures 1,245 mi. Grayson Co., to J. Frank, Clinchport, $18,693 — bridge over Mattaponi River, at West Point, King William Co., to J. S. Bowers, Whiteville, N. C., $3,420. Grand total $85,002.

Washington—At office S. J. Humes, dir. Hys., Olympia, clearing, grubbing, grading, concrete paving 2,208 mi. State Rd. 5, Sects. 1 and 2, Pierce Co., to Albertson & Connell Bros., Inc., 113½ A St., Tacoma, $42,181—1,567 mi. State Rd. 3, Federal Aid Project 135-1, Spokane Co., to Norris Bros., Burlington, $62,434—grading, crushed stone surfacing Inland Empire Hy. Eastern Route, Whitman Co., to F. R. Hewett, 420 22nd Ave., Spokane, $29,000. Grand total $133,615. Noted June 12.

Wisconsin — State Hy. Comn., and Barron, Ashland, Bayfield and Polk Counties, Telegram Bldg., Superior, graveling 5.76 mi. Ashland Junction-Ashland and Washburn Rds., to V. Nelson, Superior, $35,955—grading 0.57 mi. Cameron-Rice Lake Rd., to Waters Bros., Holcombe, $9,156—Jefferson Street Overhead, to Minneapolis Bridge Co., 924 Metropolitan Life Bldg., Minneapolis, Minn., $5,452. Grand total $50,563. Noted July 3.

Wisconsin—State and Monroe Co. Hy. Comns., Court House, LaCrosse, concrete paving 5.53 mi. Black River Falls-Millston Rd., to Universal Eng. Co., Medford, $96,444—Tomah Bridge 1, to M. Schroeder, Cashton, $10,850 — Tomah Bridge 2, to E. Blank, Cochane, $3,511. Grand total $110,805. Noted July 3.

Wisconsin — State Hy. and Door and Oconto Counties Hy. Comns., Green Bay, concrete paving 7.465 mi. Oconto-North County Line Rd., to Schuster Constr. Co., Denmark, $152,141—8.9 mi. Lakewood-North County Line Rd., to G. Millerd, New London, $14,220—graveling 10.5 mi. Institute-Sister Bay Rd., to M. J. Lotto, Green Bay, $30,688—9.3 mi. same road, to H. Boulanger, Casco, $29,600—crushed stone surfacing 4.6 mi. same road, to Daanen & Janssen, De Pere, $12,592; Grand total $239,241. Noted June 27.

Wisconsin—State and Portage Co. Hy. Comns., Wisconsin Rapids, grading, concrete paving 70,790 sq.yd. State Trunk Hy. 66, Stevens Point—Ellis Rd., to Wilson Constr. Co., Appleton, $102,870.

Wyoming—State Hy. Comn., Cheyenne, grading 13.55 mi. Fremont Co., to Sharrock & Pursel, Casper $87,762—5.7 mi. Uinta Co., A. O. Thorn, Springville, Utah, $30,576—11.9 mi. Niobrara Co., to Stevens Bros., Endicott Bldg., St. Paul, Minn., $48,150—reconstructing 2.6 mi. Albany Co., to M. R. Deakin, Ft. Collins, Colo., $29,080. Grand total $195,568. Noted July 3.

Ontario — Dpt. P. Hys., Parliament Bldgs., Toronto, concrete paving 5.8 mi. Branford northerly road, to Brennan Paving Co. Ltd., 400 Gage Ave. N., Hamilton—2.4 mi. road Galt towards Hespeler, to Holmes & Jamieson, Kemptville—7.08 mi. road from Mitchell to Kennecott, to W. H. Harve & Sons, Deseronto —6.16 mi. Teviotdale southeasterly, to Godson Contg. Co. Ltd., 203 Richmond St. W., Toronto —4 mi. Bismark easterly, to Johnson Bros. Co. Ltd., 43½ Market St., Brandford — 4.15 mi. Chemong Turn to Fowlers Corners to A. E. Jupp Constr. Co., 170 Berkeley St., Toronto—asphaltic concrete paving 4 mi. Huron Church line Rd., to S. P. West Constr. Co. Ltd., Detroit St., Sandwich—mixed macadam paving 5.75 mi. Galt-Dundas Rd., to Rayner Constr. Co. Ltd., 159 Bay St., Toronto—Brockville northerly 6 mi. and constructing South Nation Bridge, Cass, to Grand Bros. Constr. Co., 356 Bank St., Ottawa—penetration macadam paving Fergus northerly 5.4 mi. road, to H. T. Routly Constr. Co., 21 Dundas Sq., Toronto—grading, concrete culverts 6.4 mi. York County west end Greenbank Div., to E. Corner Contg. Co., 710 Manning Ave., Toronto—5 mi. Midhurst to Minesing, to Stanley Smith, Midland—7 mi. Galt South to Dumfries, to W. E. Taylor, 22 Falcon St., Toronto, 13.7 mi. Morpeth to Thamesville Rd., to Canada Paving & Supply Corp.—East Windsor—6 mi. Ingersoll to Mount Elgin Rd. and overhead north of Beaverton, to W. G. Campbell Eng. Co., 142 Geoffrey St., Toronto—6 mi. Collingwood easterly, to Holdcroft Constr. Co., 320 Alfred St., Kingston — overhead east of Owen Sound, to W. Davies, 140 Trinity St., Stratford—bridges over Indian River, to Smith Falls Constr. Co., Smith Falls—east of Collingswood, to W. Clark & Son, 729 3rd St., Owen Sound—installing tile, Durham, to Day Bros., Guelph. Est. $1,750,000.

Ont., Hamilton—Asphalt paving Dunsmore Rd., Augusta and Hess Sts., Mount Royal and West Aves., day labor. $71,365. W. L. McFaul, city engr.

Ont., Opasatika—Dpt. Northern Development, Parliament Bldgs., Toronto, grading Cochrane-Hearst Trunk Rd., to Chisolm Constr. Co. Ltd., 116 Cumberland St., Cornwall. Est. $60,000. Noted June 12.

Ont., Ottawa—To Standard Paving Co. Ltd., Elgin, asphalt paving Somerset St. $32,437; Main St. $11,834; Dalhousie St., $35,477—to Bd. P. Wks., City Hall, Laurier Ave. W. $31,990; Delaware Ave. $10,110. Grand total $121,848.

Ont., Thorold—Concrete paving 2¼ mi. Queens, Regent, Brock, West, St. Davids, Elgin, and Wellands Sts., 18- 24 ft., to S. P. West Paving Co., Sandwich, $126,806. Est. $130,000.

Ont., Toronto — City and York Co. Rds. Comns., asphaltic concrete paving 1.25 mi. Main St., Stouffville, to Warren Bituminous Paving Co., 54 University Ave. Est. $35,000.

Ont., Toronto—East York Twp., asphalt on concrete paving 40,000 sq.yd. Chisolm Blvd., Dilworth Crescent, Monarch Park, Springdale, Woodington, Woodmount Aves., to Rayner Constr. Co. Ltd., 159 Bay St. Est. $150,000.

Ont., Waterloo—Asphalt on concrete paving ¾ mi. roads, to Standard Paving Co. Ltd., H. O. Central Chamber, Ottawa. Est. $35,000.

Ont., Welland—Welland Co., paving connecting link, to Dufferin Paving & Crushed Stone Co. Ltd., foot Bathurst St., Toronto. Est. $40,000.

Ont., Weston—Curbing, guttering, asphalt on concrete paving 0.5 mi., to Constructing & Paving Co., Confederation Life Bldg., Toronto. Est. $25,000.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Indiana—Bd. Comrs. Hancock Co. (Greenfield) and Marion Co. (Indianapolis), at Greenfield, dredging 8 mi. Sugar Creek. $50,000. D. Thomas, Greenfield, engr.

Ind., Auburn — Bd. Comrs. De Kalb Co., dredging Cedar Creek Drains. $100,000. E. T. Miser, Auburn, engr.

Ind., Princeton — Bd. Comrs. Gibson Co., levees along Patoka and Wabash Rivers. $1,000,000. R. Munford, Princeton, engr.

La., Shreveport—State Bd. Engineers, New Orleans, postponed taking bids 1,200 ft. 3 row pile deck on right bank Red River between Traffic and St. Louis Southwestern (Cotton Belt) Ry. bridges. Old bids returned. H. E. Barnes, City Hall, engr. Noted June 12.

BIDS ASKED

Calif., Live Oak—July 26, by W. H. King, secy. Reclamation Dist. 777, 4.5 mi. drainage canals. M. C. Polk, Chico, engr.

Calif., Los Angeles—July 23, by City Harbor Dpt., concrete sheet pile bulkhead and anchorage wharf at Berths 144, 145 and 146, incl. 33,750 lin.ft. concrete bearing piles, 28,900 lin.ft. concrete sheet piling, 82 concrete wales, 163 concrete anchors and rod assemblies, 5,700 lin.ft. creosoted bearing piles.

Ind., Delphi—July 21, by Bd. Supervs. Carroll Co., dredging John R. Harness Ditch. $26,000. C. Langston, Delphi, engr.

N. Y., Long Island City—July 22, by Park Bd., Dpt., Parks, The Arsenal 64th St. and 5th Ave., Central Park, New York, W. R. Herrick, pres., excavating ditches and draining swamp areas in Kissena Park.

B. C., New Westminster—July 25, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., completing Sect. 5 and constructing 3,000 of Sect. 6, North Jetty at mouth of Fraser River. $120,000.

B. C., Steveston—July 25, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., 8,000 ft. South Jetty, on Fraser River, Dist. New Westminster. $330,000.

Excavation, Drainage, Irrigation, Levees, River and Harbor (Continued)

Que., Champlain—July 22, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., improvements (shore protection wall). $21,000.

CONTRACTS AWARDED

Mass., Lynn—City, J. F. Manning, mayor, City Hall, approach leading from Lynnfield St. to standpipe, incl. 2,500 cu.yd. earth and 500 cu.yd. ledge excav., to M. McDonough Co., Bway., Malden. Est. $25,000.

Mo., Platte City—Platte River D. D. 1, J. A. Settle, secy., straightening, excavating 2,300,000 cu.yd. Platte River, to Clyde Peterson & Co., Savannah, at $0.0815 per cu.yd. accepting bonds in payment.

Pa., Pittsburgh — Allegheny Co., excavating new channel for Chartiers Creek to eliminate 2 bridges, near here, to S. T. Brotmarkle, 2219 Brownsville Rd., $177,165. Est. $217,000. Noted June 26.

Tex., Harlingen—Cameron Co. Water Impvt. Dist. 1, 196,000 ft. canal lining, to Gunite Concrete & Constr. Co., 1301 Woodsweather Rd., Kansas City, Mo., $170,000.

Ont., Billings Bridge — C. H. Guest, clk. Gloucester Twp., Alexander Municipal Drain, incl. 45,301 cu.yd. excav., concrete culverts, bridges, to P. Berube, Ottawa, $22,692. Est. $34,000. Noted June 26.

Ont., Port Arthur—Dpt. P. Wks., Ottawa, dredging, to Great Lakes Dredging & Contg. Co., Port Arthur, $71,355. Noted Apr. 24.

Ont., Port Hope—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging, to R. G. Weddell, Toronto, $12,960.

Que., Rimouski—Dpt. P. Wks., Ottawa, dredging, to Foundation Maritime Ltd., Quebec, $44,378.

Public Bond Elections

Coming Bond Elections

Sewers—Elmsford, N. Y., July 26. $700,000.

Bonds Voted

Waterworks—Phoenix, Ariz., $2,364,000.

Sewers and Disposal System — Phoenix, Ariz., $817,000.

High School—Nashville, Tenn., $150,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Fla., Daytona Beach—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office.

Fla., Jacksonville — POST OFFICE — Treas. Dpt. at office Sup. Archt., post office, Duval St.

Fla., Key West—COURT HOUSE and CUSTOM HOUSE—Treas. Dpt. at office Sup. Archt., court house and custom house.

Idaho, Caldwell—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches U. S. Post office.

Miss., Gulfport — DREDGING—U. S. Eng., Mobile, Ala., 3,600,000 cu.yd. in Gulfport harbor.

R. I., Melville—POWER PLANT—Spec. 6031—Yards & Docks, Navy Dpt., brick, steel power plant building, concrete found., at Naval Fuel Depot.

Va., Norfolk—DREDGING—Spec. 6223—Yards & Docks, Navy Dpt., dredging at Naval Operating Base, Hampton Roads.

BIDS ASKED

Ala., Mobile—DREDGING—Aug. 11 by U. S. Eng., Mobile, Ala., 6,000,000 cu.yd. in Mobile Bay Channel; adv. E. N.-R. July 17.

California—ROAD—July 24, by C. H. Sweetser, dist. engr. P. Rds., 461 Market St., San Francisco, grading 2.648 mi. Sect. "B," Fish Camp-Fourmile-Oakhurst Natl. Forest Rd., and 7.08 mi. Wawona Route, Yosemite Natl. Park Project 2-B-2, Mariposa Co.

California — ROADS — July 29, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, rock surfacing 8.58 mi. Sects. C and D, Yuba Pass National Forest Hy., Sierra Co.

Calif., San Francisco—HOSPITAL—Aug. 5, by Con. Q.M., 3 wards at Letterman General Hospital, Fort Mason.

Calif., San Francisco—WARD BUILDINGS—Aug. 5, by Con. Q. M., Fort Mason, three 2 story, rein.-con. ward buildings, Presidio St.

D. C., Wash.—CULVERTS—July 23, by A. L. Flint, genl. purch. officer, Panama Canal, corrugated culverts, drill casing, bolts, washers, welding rods, pipe hangers and straps, cock valves, unions, etc., Schedule 2572.

Ga., Fort Benning—DISPENSARY—Aug. 8, by Con. Q.M., dispensary building.

Ky., Louisville—EXCAVATING—July 28, by Treas. Dpt. at office Sup. Archt., preliminary excavating for U. S. Court House and Custom House.

La., New Orleans — QUARANTINE BUILDINGS—Aug. 7, at office Sup. Archt., constructing, buildings, for U. S. Quarantine Station; adv. E. N.-R. July 17.

Missouri—BRIDGES, etc.—July 22, by U. S. Eng., 1006 McCall Bldg., Memphis, Tenn., bridges, culverts, roads in connection with Bird's Point-New Madrid Floodway Drainage System.

N. J., Somerset Hills—HOSPITAL—Aug. 19, by Vet. Bu., for U. S. Veterans' Hospital, incl. roads, grading, drainage.

N. Y., Fort Wadsworth (mail Staten Island)—BARRACKS—Aug. 12, by Con. Q. M., 39 Wall St., New York, infantry battalion barracks and Utilities; adv. E. N.-R. July 17. Noted Apr. 3.

N. Y., Peekskill—POST OFFICE—Aug. 4, by Treas. Dpt. at office Sup. Archt., for U. S. Post Office.

N. Y., St. George—ACETYLENE CYLINDERS—July 18, by Superintendent Lighthouses, three hundred 180 cu.ft. acetylene cylinders.

N. Y., White Plains—POST OFFICE—Aug. 6, by Treas. Dpt. at office Sup. Archt., constructing (except freight elevator) U. S. Post office.

N. C., Wilmington—DREDGING—Aug. 15, by U. S. Eng., Wilmington, N. C., 6,363,020 cu.yd. northeast portion Sect. 3 Intracoastal Waterway from Beaufort to Cape Fear River; also 5,568,975 cu.yd. in southwest portion from Beaufort to Cape Fear River; adv. E. N.-R. July 17.

O., Chillicothe—ROADS—July 29, by Vet. Bu., roads and walks at hospital.

Tex., Randolph Field—ELECTRIC SYSTEM—July 24, by Con. Q. M., underground electric lighting system and telephone system.

Tex., Randolph Field—OFFICERS MESS, etc.—Aug. 6 at office Con. Q.M., officers mess, post exchange, bakery, incl. all utilities; adv. E. N.-R. July 17.

Tex., San Antonio—BARRACKS—Con. Q.M. bids about Aug. 7, barracks, at Camp Normoyle.

W. Va., Parkersburg—POST OFFICE—Aug. 8, at office Sup. Archt., post office; adv. E. N.-R. July 17.

Wis., Milwaukee—DERRICK BOAT—Aug. 15, by U. S. Engineers, one 25 ton steel derrick boat; adv. E. N.-R. July 17. Noted July 3.

Wyoming—ROADS—July 22, by Pub. Rds., Denver, Colo., grading, surfacing 15.063 mi. Grand Loop Park Hy., Yellowstone Natl. Park. A. E. Palen, 301 Custom House Bldg., Denver, Colo., dist. engr.

CONTRACTS AWARDED

Arizona—ROAD—Pub. Rds. Natl. Parks Serv., Grand Canyon, crushed rock surfacing 18.46 mi. Grand Canyon-Desert View Natl. Park Hy., Coconino Co., to Lord & Bishop, Sacramento, Calif., $113,950. Noted June 13.

Calif., Marsh Field—ROADS—Con. Q. M. roads, curbing, walks, culverts, to Bartlett & Mathews, 221 Bradley Bldg., Pasadena, $23,850.

D. C., Wash.—BOILER and STOKER—Vet. Bu., installing 3 boilers, mechanical stokers in Arlington Building, to Continental Constr. Co., Fort Dodge, Ia. Noted July 10.

Idaho—CULVERTS—U. S. Reclamation Serv., Burley, 3 culverts and 100 ft. 9 in. inverted syphon for Little Wood River, Milner Shoshone Canal, to Utah Constr. Co., Ogden, $20,860 and $15,229 respectively. Noted June 5.

Idaho—ROADS—Federal Bureau Pub. Rds., Ogden, grading 5.93 mi. North Fork-Payette Natl. Forest Rd., Payette Co., to J. A. Terteling & Sons, Moscow, $152,979—0.72 mi. Warm River-Yellowstone Natl. Forest Rd., Latah Co., to Robinson Constr. Co., Twin Falls, $21,861—6.9 mi. Salmon-Montana State Line Natl. Forest Rd., Lemhi Co., to Union Constr. Co., Ogden, $88,864—surfacing 15.9 mi. Heber-Fruitland Natl. Forest Rd., Wasatch Co., to Utah Constr. Co., Ogden, Utah, $35,274. Grand total $298,978. Noted July 3.

Miss., Vicksburg — EXCAVATING — U. S. Eng., P. O. Box 667, 2,963,000 cu.yd. Sects. 1, 2, 3, 4, 5 and 6, Grand Lake levee, to Sternberg Co., Arcade Bldg., St. Louis, Mo., at $0.33 per cu.yd.; 675,000 cu.yd. Item 36, on Arkansas River below South Bend, to Callahan Constr. Co., Arcade Bldg., St. Louis, Mo., at $0.20 per cu.yd.

Missouri and Illinois—PILING DIKES—U. S. Eng., St. Louis, Mo., dike construction Rockwood, Ill. and at Kinney Point Dike, Mo., to W. P. McGeorge, Pine Bluff, Ark., $54,110 and $92,780 respectively; at Brooks Point, Mo. and at Brooks Point, Ill., to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $91,653 and $84,446 respectively. Grand total $322,989. Noted June 12.

O., Ashtabula—BREAKWATER—U. S. Eng., Buffalo, N. Y., additional stone to enlarge cross section on 800 lin.ft. inner end west breakwater, to Great Lakes Dredge & Dock Co., Morgan Bldg., Buffalo, N. Y., $44,520. Noted May 29.

O., Cleveland—BREAKWATER—U. S. Eng. Office, Buffalo, N. Y., repairing breakwater, Cleveland harbor, to L. A. Wells Constr. Co., 30 Euclid Arcade, $61,740. Noted May 29.

Tex., Randolph Field—ADMINISTRATION—Con. Q. M., general contract administration building, to Murch Bros., Railway Exch. Bldg., St. Louis, Mo., $211,300, plumbing and heating, to A. H. Shafer, 829 North St. Marys St., $27,451; academic and engineering air corps buildings, to L. T. Wright & Co., Builders Exch., $86,749 and $150,000 respectively; fencing, to Southern Steel Co., 4500 South Presa St., San Antonio; installing drainage system, to Kirkwood, Wharton & Lee, 517-23 North Flores St., San Antonio, $46,000. Noted June 5.

Utah—DIKES—Dpt. Agriculture, constructing earth dikes, spillways and river control structures, Bear River Bay Migratory Bird Refuge, Boxelder Co., to Maguire & Burgraff, Butte, Mont., $84,260. Noted May 15.

Utah — ROAD — Pub. Rds., Ogden, grading, surfacing 10.84 mi. Heber-Fruitland Natl. Forest Rd., Uintah Natl. Forest, Wasatch Co., to S. H. Newell & Co., Portland, Ore., $102,943. Noted June 12.

Vt., Newport—POST OFFICE—Treas. Dpt., remodeling post office, to Chas. Weitz's Sons, 713 Mulberry St., Des Moines, Ia.

RAILWAYS

PROPOSED WORK

Texas—St. Louis-San Francisco Ry., T. G. Jonah, ch. engr., St. Louis, Mo., preliminary plans extending standard gage railroad 71 mi. between Seymour and Paducah, to connect with the Quanah, Acme & Pacific Ry.

Wyoming—Union Pacific R.R. Co., H. C. Mann, ch. engr., 15th and Dodge Sts., Omaha, Neb., preliminary plans enlarging present yards, at Cheyenne. $800,000.

BIDS ASKED

California—July 25, by Western Pacific R.R. Co., Mills Bldg., San Francisco, J. W. Williams, ch. engr., railroad from Keddie, Plumas Co., to Bieber, Lassen Co. $9,825,000.

Illinois—July 24, by Sanitary Dist. of Chicago, 910 South Michigan Ave., Chicago, 3 mi. standard gage railroad for West Side Sewage Treatment Works, carrying sludge refuse from sludge beds to storage yards in Chicago. E. J. Kelley, c/o owner, engr. Noted May 8.

Ontario—See "Contracts Awarded."

CONTRACTS AWARDED

Minnesota and Wisconsin — Minneapolis, St. Paul & Saulte Ste. Marie R.R. Co., E. A. Whitman, ch. engr., Soo Line Bldg., Minneapolis, Minn., track replacement and bridge filling from Moose Lake, Minn. to Superior, Wis., own forces. $200,000. This corrects report in June 26 issue.

Ontario—Toronto Transportation Comn., 35 Yonge St., Toronto, street railway loop, incl. rails, concrete found., trolleys, steel poles, at Front and Simcoe Sts., Toronto, day labor. $50,000. D. W. Harvey, 35 Yonge St., Toronto, engr.

SUBWAYS AND TUNNELS

BIDS ASKED

N. Y., Mount Vernon — July 23, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, stone faced rein.-con. undercrossing at Gramatan Ave., Cross County Parkway, Contr. 236. J. Downer, Bronxville, ch. engr.

N. Y., New York—July 22, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., completion construction Sect. 1-A, Route 8, 14th St., Eastern Rapid Transit R.R.

CONTRACTS AWARDED

N. J., Hillsdale—Dpt. Institutions & Agencies, State Office Bldg., Trenton, rein.-con. tunnel connecting power house and laundry at New Jersey State Hospital grounds, to M. D. Pederson, 358 Lawrence St., Perth Amboy. Est. $25,000. Noted June 12.

GRADE CROSSINGS

PROPOSED WORK

Calif., Lawndale—State Hy. Comn., Sacramento, widening underpass near here, San Mateo Co. $100,000 or more. C. H. Purcell, hy. engr.

Ont., Arnprior — Renfrew Co. (Pembroke), and Canadian Pacific Ry. Co., M. R. Fairbairn, ch. engr., H. O. Windsor St., Montreal, Que., concrete, steel overhead crossing over railroad Canadian tracks near here. $25,000. W. J. Moore, Pembroke, engr.

CONTRACTS AWARDED

O., Cleveland — New York, Chicago & St. Louis R.R. Co., H. M. Hockman, ch. engr. (Nickel Plate Dist.), substructure for 75 x 200 ft., rein.-con., steel grade crossing elimination at East 86th St. and Woodland Ave., to Marsh-Hart Co., 3030 Euclid Ave.

DAMS

PROPOSED WORK

Ky., Aurora—Southern Industries and Utilities, Inc., Wash., D. C., 6,000 ft. dam, 50 ft. high on Tennessee River, here. Francis R. Weller, Inc., Mills Bldg., Wash., D. C., consult. engrs.

PIERS AND WHARVES

BIDS ASKED

Ont., Midland—July 23, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, 200 lin.ft. extension to Government wharf. $40,000.

Que., L'Islet — WHARF — July 22, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., repairing wharf. $8,300.

Que., Ste. Anne des Monts—July 22, by N. Desjardins, secy., Dpt. P. Wks., Ottawa, widening wharf, repairing flooring system. $35,000.

AIRPORTS

PROPOSED WORK

Ind., Terra Haute—Aviation Comrs. 125 x 150 ft., steel frame administration building and hangar, 2.5 mi. south of here. $150,000. R. Prox, 1608 South 4th St., engr.

CONTRACTS AWARDED

Mass., Mansfield—Trustee of F. Boltz, c/o L. G. Foster, archt., 101 North Main St., 1 and 2 story, concrete, steel, airport hangar and office, Fruit St., to G. P. Willard, 117 South St., Wrentham. Est. $30,000. Noted July 3.

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GRAIN ELEVATORS

BIDS ASKED

N. D., Wahpeton—GRAIN ELEVATOR—See "Contracts Awarded."

CONTRACTS AWARDED

N. D., Wahpeton — GRAIN ELEVATOR — Farmers Union Terminal Assn., M. W. Thatcher, mgr., Minnesota Bldg., St. Paul, Minn., 1 m. bu. grain elevator, day labor. $100,000. Private plans.

B. C., Vancouver—GRAIN ELEVATOR—C. D. Howe & Co., engrs., Cassiar St., 100 x 300 ft., 1,820,000 bu. rein.-con. addition to Grain Elevator 1, to Carter, Halls, Aldinger Co., 510 Hastings St. W., for Vancouver Harbour Comn., Dunberry Ave. $380,000. Est. $1,000,000. Noted June 12.

POWER AND LIGHTING

PROPOSED WORK

Okla., Britton — City preliminary plans 60 post "White Way" lighting system. $5,000. L. A. Riley, Britton, engr.

BIDS ASKED

N. Y., New York—July 22, by Bd. Transportation, J. H. Delaney, chn. 250 Hudson St., furnishing, installing station and tunnel lighting equipment, incl. electric heating and toilet ventilation, for portion Independent System of City-owned Rapid Transit railroads between and adjacent to 72nd St. and 110th St. Stations.

CONTRACTS AWARDED

Connecticut—Rockville-Willimantic Lighting Co., Willimantic, 20 mi. high tension line between Willimantic and Rockville, incl. 580 new poles, replacing wires. Owner builds. Private plans.

Wash., Seattle—Bd. P. Wks., 4 steel transmission towers crossing Duwamish Waterway, on West Michigan St., to General Constr. Co., Colman Bldg., $28,125. Noted June 19.

Ont., Chats Falls—Chats Falls Power Co., Montreal, Que., equipment, incl. 8 large generators, for power development, to Canadian Westinghouse Mfg. Co., Hamilton. $2,000,000. Noted Mar. 20 under "Ontario."

SPORTS AND PARKS

PROPOSED WORK

Ind., Noblesville—Park Bd. swimming pool. $60,000. A. W. Brayton, Jr., 721 K. of P. Bldg., Indianapolis, landscape archt.

Mass., Lowell—City, Park Dpt., concrete, brick swimming pool, O'Donnell Playground. $25,000. J. W. Kerhan, supt.

Mass., Waltham—City, P. Duane, mayor, City Hall, bathing pool, pavilion between Grove and Clark Sts. To exceed $25,000.

N. J., Fort Lee and Englewood—Bd. City Council preliminary plans converting Crystal Lake into 200 x 200 ft. swimming pool, by covering bottom with sand and installing modern chlorinator. $25,000. J. Paluga, Fort Lee, lessee. Noted July 3.

N. J., Palisades Park—Bd. Educ., Municipal Bldg., sketches athletic field, incl. grading, sodding, football and baseball fields, tracks, tennis courts, grandstand, Roosevelt Pl. and Erie R.R. tracks. $25,000. C. F. Blood, 22 Broad Ave., engr.

N. J., Madison—See "Clubs."

BIDS ASKED

D. C., Wash.—July 23, by District Comrs., District Bldg., roads, walks, steps, seating, and other necessary work to fit up for athletic purposes the site adjoining Dunbar High School.

Mass., Malden (br. Boston)—City of Malden, School Field Com., taking bids steel bleachers, high school field. $30,000. C. F. Springall, 50 Park St., archt.

N. J., Nutley — M. A. Wolf, archt., 845 Broad St., Newark, taking bids general contract amusement park, incl. concession booths, service station, stores, 2 swimming pools, bath houses, for Harrison Park Impvt. Co., 24 Branford Pl., Newark. Est. $150,000. Noted July 10.

N. Y., Brooklyn—July 22, by Park Bd., Dpt. Parks, Arsenal Bldg., Central Park, 5th Ave. and 64th St., New York, W. R. Herrick, pres., completing construction Winthrop Park and Playground, Russell and Monitor Sts., Driggs and Nassau Aves.

CONTRACTS AWARDED

Mass., East Northfield—R. H. Doane, archt., 60 Batterymarch St., Boston, concrete swimming pool, appurtenances, to W. J. Sennott, 333 Washington St., Boston. Est. $25,000.

Mass., Leominster—City, Dpt. P. Buildings, grading for athletic and recreation field, to Tragia Constr. Co., Leominster, $19,500. Noted May 22. Est. $25,000.

N. J., West New York—Comrs. Bd. Recreation, Municipal Bldg., rein.-con. stadium, 5,000 seating capacity, at playground at Jackson and Madison Sts., to R. and F. Concreting Co., Inc., 988 Bergenline Ave. Union City, $46,500. Noted June 19.

N. Y., New York—Bd. Educ., 500 Park Ave., general contract athletic field, bleachers, field house at George Washington High School, to R. C. Waldie, $66,000. Noted June 26.

Pa., Mt. Lebanon — Geisler & Smithyman, archts., 335 Boulevard of Allies, Pittsburgh, 100 x 225 ft. concrete swimming pool, 2 story, basement, 60 x 100 ft. bathouse, to T. Dangelico, 420 Cape May Ave., Pittsburgh, $61,079; plumbing and heating, to Superior Pump & Sanitation, 24th St., Pittsburgh, $21,320. Total est. $80,000. Noted June 26.

Ont., Kitchener—For 75 x 190 ft., rein.-con. swimming pool in Victoria Park, to S. and G. C. Hagedorn, 26 Bingeman St., $25,000.

HEATING AND VENTILATING

PROPOSED WORK

N. J., Skillman—Dpt. Institutions & Agencies, State Office Bldg., Trenton, rejected bids June 20, boiler stokers, boiler settings, breeching, smoke stack, piping and equipment for power house at State Village for Epileptics. Will readvertise. Noted June 12.

BIDS ASKED

N. Y., Amenia — July 30, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating, sanitary work, kitchen equipment, Kitchen and Dining Hall Building DF, bakery ovens, machinery, for Bakery Building SB, Wassaic State School; adv. E. N.-R. July 17.

N. Y., Marcy—Aug. 6, by Commissioner Dpt., Mental Hygiene, State Office Bldg., Albany, heating work, deaeration apparatus, at Marcy Div., Utica State Hospital; adv. E. N.-R. July 17.

CONTRACTS AWARDED

Mass., Worcester — City, R. P. Spaulding, heating in high school, Richlands and Freeland Sts., to J. G. LaMotte & Son, Inc., 21 Waldo St.; plumbing, to McMahon & Murphy, Worcester; electrical work, to Scrimgeour Electric Co., Worcester. Est. exceeds $25,000. Noted June 26.

Minn., St. Paul—First Natl. Bank, c/o E. A. Tyler, Merchants Natl. Bank Bldg., plumbing, heating and ventilating in 32 story, 140 x 150 ft. bank and office building, to Hankee Heating Co., 235 Merchants Natl. Bank Bldg. Total est. $3,000,000. Noted June 26, under "Banks, Contracts Awarded."

Ont., Guelph — Dpt. P. Wks., Parliament Bldgs., Toronto, steam mains, pumping equipment (vacuum steam) in Ontario Agricultural College, to Sheppard & Abbot, 119 Harbord St., Toronto. Est. $35,000.

UNCLASSIFIED

PROPOSED WORK

Calif., San Francisco—PIER SHED—State of California, Harbor Comn., Ferry Bldg., 1 story, rein.-con., steel, timber pier shed, Pier 1. $90,000. F. G. White, Ferry Bldg., San Francisco, engr.

Calif., San Francisco—STUDIOS, etc.—San Francisco Fine Arts Building c/o Clausen & Amandes, archts., Hearst Bldg., 20 story, basement, Class A Gothic type studios, hotel, stores, Ellis and Taylor Sts. $2,800,000.

Colo., Pueblo—CAR ICING PLATFORM—Missouri Pacific R.R. Co., St. Louis, Mo., E. A. Hadley, ch. engr., and Denver & Rio Grande Western R.R. Co., Equitable Bldg., Denver, A. O. Ridgeway, ch. engr., car icing platform. $50,000.

N. Y., New York—FREIGHT TERMINAL—New York Central R.R., B. F. Freeman, ch. engr., 250 x 1,250 ft. freight terminal, Clarkson, Spring, Washington and West Sts. $10,000,000-$15,000,000.

Texas and New Mexico—OIL PIPE LINE—Shell Pipe Line Corp., Shell Bldg., St. Louis, Mo., preliminary plans extending pipe line from Hendrick fields, Winkler Co., Tex., to Hobbs oil field, Lea Co., New Mexico, incl. pumping stations, equipment. $300,000. Private plans.

Tex., Port Arthur—STILLS—Texas Co., 135 East 42nd St., New York, and Port Arthur, new stills at refinery plant, to replace ones recently destroyed by fire. $600,000. Private plans. May build by day labor.

Tex., San Antonio—SUB-DIVISION DEVELOPMENT — Compton Investment Co., c/o Majestic Bldg., purchased 80 acre plot on North Loop, off Jones-Maltberger Rd., and plans developing same, incl. natural gas system, paving, sewers, telephone system, water lines. Private plans.

Utah—GAS MAINS—Wasatch Gas Co., Salt Lake City, J. D. Roberts, vice pres., preliminary plans 18 mi. gas mains from Salt Lake City to International Smelting Co. smelter at Tooele. $200,000.

BIDS ASKED

Mass., Haverhill—CAR HOUSE—July 23, by Eastern Massachusetts Street Ry. Co., 38 Chauncy St., Boston, reconstructing 1 story, brick, steel, concrete car house, River St. $25,000 or more.

Mass., Malden (br. Boston)—FOUNDATION—See "Hospitals."

N. Y., Long Island City—BORINGS—July 22, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, borings in 37th and 38th Sts. and private property east of 2nd Ave., Manhattan and Borden Ave. and private property west of Vernon Blvd., Agreement "JP."

CONTRACTS AWARDED

Kansas and Colorado—GAS PIPE LINE—A. J. Hardenfdorf, Hugoton, Kan., 90 mi. steel gas pipe line from Hugoton, Kan. to Lamar Okla. Owner builds.

Mass., Woburn—GREENHOUSE—C. A. Carlson, 399 Washington St., 1 story, brick, concrete, steel, glass greenhouse, boiler house, concrete found., Washington St., to King Constr. Co., 25 Huntington Ave., Boston. Est. $25,000.

Okla., Oklahoma City—DEPOT—St. Louis-San Francisco Ry. Co., 610 Frisco Bldg., St. Louis, Mo., F. G. Jonah, ch. engr., and Chicago, Rock Island & Pacific R.R. Co., La Salle St. Sta., Chicago, Ill., W. H. Peterson, ch. engr., 2 story, basement, 500 x 560 ft., concrete, steel, brick, Bedford stone, to Tankersly Constr. Co., Grain Exch. Bldg., Oklahoma City, $560,000. Noted June 26.

Pennsylvania, Ohio and New York — PIPE LINE—Susquehanna Pipe Line Co., c/o Sun Oil Co., S. B. Eckert, vice pres., Finance Bldg., Phila., Pa., (1st unit) 700 mi. 6 and 8 in. steel welded pipe line and terminals erected at various intervals between Marcus Hook, Pa. (Delaware Co.), Cleveland, O. (Cuyahoga Co.) to Syracuse, N. Y. (Onondago Co.), to MacPherson Constr. Co., Magnolia Bldg., Dallas, Tex. Total est. $5,000,000. Private plans.

Texas — NATURAL GAS SYSTEM — Texas Gas Utilities Co., Del Rio, 38 mi. 2- to 6-in. natural gas system, in Eagle Pass and vicinity, to N. A. Saigh Co., 510 Builders Exch. Bldg., San Antonio. $400,000.

Texas, Kansas and Missouri — GAS PIPE LINE — Phillips Petroleum Co., Bartlesville, Okla., 8 in. gas pipe line from Borger, Tex., to Wichita, Kan., and St. Louis, Mo., laying and welding, to Kelly-Dempsey & Co., Hunt Bldg., Tulsa, Okla. Noted June 12, under "Contracts Awarded."

Tex., San Antonio — GAS LINE — G. & C. Hagelstein, 310 North St. Marys St., 1.25 mi. 8 in. gas main extension, to San Antonio Pub. Serv. Co., St. Marys St., $28,000.

MATERIALS

BIDS ASKED

SNOW FENCE—**Sibley, Ia.**—July 22, at office Auditor Osceola Co., 25,000 lin.ft. snow fence, 2,500 steel snow fence posts. E. Winkel, Sibley, co. engr.

PIPE, PIPE FITTINGS, etc.—**New York, N. Y.**—July 21, by J. G. W. Greene, comr. Hospitals, Municipal Bldg., pipe, pipe fittings, engineers plumbing and steamfitters supplies.

CABLE, etc.—**Cleveland, O.**—July 18, by City, furnishing underground cable for division of traffic, Police Dpt.; also pipe, special bends and fittings, piping for safety zones, warning beacons and stands for safety zones.

PIPE, etc.—**Tipton, Okla.**—July 21, by S. Parker, city clk., 4,500 lin.ft. 4 in. c.i. pipe, 7 valves, 6 hydrants, 600 lb. lead, 3,500 lin.ft. 8 in. vitr. pipe, 100 lb. cement. $7,000. A. B. Carley, Tipton, engr.

CONTRACTS AWARDED

LEAD COVERED CABLE—**Boston, Mass.**—City, Supply Dpt., City Hall, lead covered cable, to F. M. Ferrin, 3 Park St., $11,034. Noted May 22.

CONCRETE and SAND—**St. George, N. Y.**—J. A. Lynch, pres. Richmond Boro, 700 cu.yd. concrete and paving sand, to J. Thompson Sons, $1,715. Noted June 26.

GRAVEL—**Cordell, Okla.**—State Hy. Dpt., Oklahoma City, gravel for maintenance surfacing Hys. 14 and 41, Washita Co., to Western Constr. Co., Hales Bldg., Oklahoma City, $39,460. Est. $50,000. Noted June 26.

EQUIPMENT

BIDS ASKED

TRUCKS — **Iowa** — July 22, by State Hy. Comn., Ames, thirty-eight 3-ton maintenance trucks.

LAUNDRY HOPPERS, etc.—**Marcy, N. Y.**—July 30, by Comr. Dpt. Mental Hygiene, Albany; laundry hoppers, chutes, etc., at laundry building, Utica State Hospital, Marcy Div.; adv. E. N.-R. July 17.

FOREIGN

Chile—Chilean State Ry. Co., 100 pound steel rails, to Colorado Fuel & Iron Co., Pueblo, Colo., $250,000.

Mexico, Nuevo Laredo—Swift & Co., Cocker and Exchange Aves., Chicago, Ill., or c/o G. Godtz, P. O. Box 879, Laredo, Tex., 1 story, 65 x 94 ft., rein.-con. refinery, plain found., to E. H. Page, 205 Ugarte Bldg., Laredo, Tex., $750,000. Noted June 12.

Buildings

RESIDENTIAL

BIDS ASKED

Calif., San Francisco — See "Contracts Awarded."

Mass., Boston—July 23, by Riverway Square Trust Co., O. F. Farley, trustee, 6 Beacon St., 4 story (6 unit), brick, steel, plain found., Riverway. $200,000. F. A. Bourne, 177 State St., archt.

N. J., Bloomfield—M. A .Wolf, archt., 845 Broad St., Newark, bids about July 15, general contract 5 story, 110 x 115 ft., brick, steel, plain found., Broad St. and Comley Pl., for Okin & Issacs, c/o architect. $150,000. Former bids rejected. Noted July 10.

Buildings—Residential (Continued)

N. J., Wood Ridge—See "Contracts Awarded."

Pa., Bryn Mawr—Bryn Mawr Avenue Corp., c/o R. G. Pratt, archt., 1420 Walnut St., Phila., taking bids 6 story, basement, 75 x 160 ft., rein.-con., brick, steel, plain found., Montgomery Ave. and Morris Rd. $450,000.

Wash., Seattle—Schack & Young, archts., Central Bldg., bids about Aug. 1, general contract 6 story, basement, 46½ x 120 ft., brick, cast stone, steel apartment hotel, Terry and Spring Sts., for D. B. Mackintosh, Mackintosh-Truman Lumber Co. $200,000.

Wash., Yakima—J. G. Von Herberg, bids about Aug. 1, general contract 14 story, basement, brick, terra cotta hotel, Yakima Ave. and 4th St. $175,000. J. W. Maloney, Yakima, archt. Noted Apr. 10.

CONTRACTS AWARDED

Ariz., Phoenix — Arizona Biltmore Hotel, enlarging dining room and constructing hotel addition, to Wm. Simpson Constr. Co., Phoenix. $200,000.

Calif., San Francisco—W. Van Herrick, 50 Laguna St., 6 story, basement, rein.-con., Vallejo near Franklin St., day labor and segregated contracts. Est. $350,000. J. G. Little, 251 Kearny St., engr.

N. J., Woodbridge—Marile Constr. Co., Hamilton Ave., Fairview, 3 story, basement, brick, steel, Hackensack St., separate contracts. $150,000. L. Vivoli, 593 Palisade Ave., Grantwood, archt.

Okla., Oklahoma City—Oklahoma Savings & Loan Co., 300 North Robertson St., 4 and 6 story, 75 x 120 ft., rein.-con., brick, stone addition, to C. E. Huffman & Son, Southwest Natl. Bank Bldg. Est. $175,000.

Ont., Toronto—Frontenac Investments, c/o A. Latcham, 111 Vaughan Rd., 12 story, basement, 68 x 150 ft., concrete, stone, brick apartment, incl. garage, to Miller-Van Dyke Constr. Co., 73 Adelaide St. W., reinforcing steel sublet, to Truscon Steel Co. of Canada, Federal Bldg. Est. $300,000.

CLUBS

PROPOSED WORK

Calif., San Francisco—Robert Dollar Co., 311 California St., sketches by C. McCall, 1404 Franklin St., Class A rein.-con. club, Howard St. and The Embarcadero. $150,000.

Mich., Detroit—University Club, c/o Smith, Hinchman & Grylls, archts., 800 Marquette Bldg., 3 story, basement, brick, steel, concrete, stone, plain found., East Jefferson Ave. $300,000.

N. J., Madison — Madison Golf Club, Green Ave., plans by L. E. Jallade, 15 East 47th St., New York, 2 story country club and golf course, incl. swimming pool, tennis courts. $150,000.

CONTRACTS AWARDED

Conn., New Haven—New Haven Lawn Club, 194 Whitney Ave., 2 story basement, 70 x 128 ft., brick, steel, concrete club house, incl. ball room, squash courts, locker rooms, Whitney Ave., to Dwight Building Co., 67 Church St. Est. $250,000.

Fla., Miami Beach—R. T. Pancoast, archt., Masonic Bldg., general contract club, Ocean Front at 90th St., to John B. Orr Co., Northeast 6th St., Miami, for Surf Club, Inc., Lincoln Rd. Noted May 29.

HOSPITALS

PROPOSED WORK

Me., Togus—National Home for Volunteer Soldiers, J. L. Boyle, Augusta, sketches by Coombs & Harriman, 11 Lisbon St., Lewiston, brick, steel soldiers hospital. $750,000.

Mass., Malden (br. Boston)—Malden Hospital, E. P. Bliss, chn. com. in charge, taking bids concrete foundation, incl. some piling, for units of hospital group. To exceed $25,000. Kendall, Taylor & Co., 209 Columbus Ave., Boston, archts. Noted June 26.

Mass., Southbridge — Harrington Hospital Corp., C. D. Harrington, pres. and chn. Bd. Trustees, plans by Derby, Barnes & Champney, 3 Joy St., Boston, 2 story, basement, brick, stone, Oakes Ave. $200,000. A. Franklin, Inc., 25 Haverhill St., Boston, engrs. Noted June 26.

Mich., Wyandotte—Wyandotte General Hospital plans by D. V. Snyder, 939 Penobscot Bldg., Detroit, 4 story, 43 x 130 ft. nurses home, and 3 story, basement, brick, steel rein.-con. hospital addition, plain found., Van Alstyne Blvd. $275,000. Noted Oct. 24.

Minn., Minneapolis—Glen Lake Sanatorium Comn., E. C. Gale, chn., 1430 Rand Bldg., plans by Sund & Dunham, 512 Essex Bldg., 3 story, basement, rein.-con., brick, stone, hollow tile hospital service building, at Glen Lake Sanatorium, near Hopkins. $150,000.

Mo., St. Louis—St. Lukes Hospital, R. D. S. Putney, supt., plans by LaBeaume & Klein, 716 Amer. Trust Bldg., 5 story, (ultimately 8 story) basement, brick, steel, stone rein.-con. addition, plain found., 5535 Delmar St. Brussel & Viterbo, 1628 Arcade Bldg., engrs. Noted Aug. 9.

Pa., Johnstown — Owner, c/o B. Tourison, archt., 222 East Mt. Pleasant Ave., Phila., sketches 4 story, basement, concrete, brick, steel, limestone hospitals. $300,000. Architect desires information hospital equipment.

R. I., Pawtucket — Pawtucket Memorial Hospital, E. N. Littlefield, soon takes bids 3 story, basement, brick, stone, plain found., Prospect and Beechwood Sts. $200,000. Monahan & Meikle, 255 Main St., archts. Noted Dec. 19.

Va., Richmond—St. Phillips Hospital School of Nursing plans by Baskerville & Lambert, Travelers Bldg., 6 story educational unit and dormitory.

Ont., Mimico — Dpt. P. Wks., Parliament Bldgs., Toronto, plans by F. R. Heakes, c/o owner, 2 story, basement, brick, concrete, steel addition. $200,000.

BIDS ASKED

Calif., San Bernardino — Sisters of Charity, taking bids 5 story, 200 x 200 ft., rein.-con., stucco hospital, and 3 story, 100 x 100 ft. chapel and convent, Highland and Waterman Aves. $500,000. I. E. Loveless, 211 Robertson Bldg., Beverly Hills, archt.

Md., Chestertown—July 28, by H. P. Hopkins, archts., 347 North Charles St., Baltimore, 2 story, basement, 34 x 105 ft., brick, concrete, steel hospital, for Kent Co. and Northern Queen Anne General Hospital.

Mass., Springfield — July 25, by Springfield Hospital, 759 Chestnut St., and Stevens & Lee, archts., 45 Newbury St., Boston, 7 story, basement, 60 x 200 ft. hospital addition and 2 story, basement, 50 x241 ft. service building, brick, limestone, steel, plain founds., North Chestnut and Springfield Sts., $1,000,000; heating and ventilating, est. exceeds $25,000; electrical work, $25,000 or more; plumbing, est. exceeds $25,000. Noted July 10.

Mass., Wellesley (br. Boston)—Convalescent Home for Childrens Hospital, Forest St., taking bids 2 story, basement, brick, steel isolation building, plain found., Forest St. $150,000. S. W. Mead, Barristers Hall, Boston, archt.

Mich., Battle Creek — July 21, by Battle Creek General Hospital Assn., Ward Bldg., 6 story, basement, brick, steel, rein.-con., plain found., Irving Park site. $250,000. Berlin & Swern, 228 North La Salle St., Chicago, Ill., archts. Noted June 19.

N. Y., Marcy—Aug. 6, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, superintendents residence, staff accommodations building, completing Continued Treatment Building 1, and assembly hall, Marcy Div., Utica State Hospital; adv. E. N.-R. July 17.

Okla., Vinita—July 22, by Bd. Affairs, 3 story, basement, 64 x 120 ft., rein.-con., brick hospital, plain found. $150,000. C. W. Dawson, Muskogee, archt. Noted June 26.

Pa., Phila. — July 23, by Comn. of Pennsylvania Dpt. Properties & Suplies, R. E. Taylor, secy., Harrisburg, 3 story, basement, 22 x 316 ft. and 38 x 53 ft., brick, steel receiving ward, plain found. Lawrie & Green, 3rd and Foster Sts., Harrisburg, archts.

CONTRACTS AWARDED

Ala., Gadsden—Missionary Servants of Blessed Trinity, Holy Trinity, general contract 5 story, sub-basement, basement, brick, steel hospital, plain found., 750,000 cu.ft. flow space, 3rd St. and Moragne Park, to Foster & Creighton Co., 1004 Protective Life Bldg., Birmingham. Total est. $500,000. Noted Apr. 24.

Mass., Medford (br. Boston) — Lawrence Memorial Hospital, 170 Governors Ave., altering and constructing 3 story, basement, brick, stone, steel, nurses home addition, plain found., to F. C. Alexander, Old South Bldg., Boston. Est. $150,000. Noted June 26.

Tex., Galveston—State Bd. Control, Austin, 4 story, brick, stone, rein.-con., psychopathic hospital, to H. W. Underhill Contsr. Co., Constr. Industrial Bldg., Dallas, $108,877. Noted May 27.

B. C., Vancouver—St. Paul's Hospital, general contract 5 story, basement, 40 x 245 ft., rein.-con., brick, terra cotta, nurses home, plain found., to Carter, Halls, Aldinger Co., 510 Hasting St. W., $233,355. Noted June 12.

CHURCHES

PROPOSED WORK

Conn., Waterbury—West Side Hill Methodist Episcopal Church soon lets contract 3 story, basement, brick, stone, West Main St. $150,000. Bureau of Architects, 1701 Arch St., Phila., Pa., archts. Noted July 10.

Ind., Gary—Catholic Church plans by C. W. Nicol, 310 South Michigan Ave., rein.-con., brick church, rectory, auditorium. $500,000.

Mass., Dorchester (sta. Boston)—Congregation Mishkan Israel, c/o M. E. Levy, archt., 43 Tremont St., Boston, revised plans 1 story, basement, brick, stone synagogue, concrete found., 137 Dalota St. $150,000. Former bids rejected. Noted Jan. 2.

N. J., Jersey City—Owner, c/o Fanning & Shaw, archts., 49 Ward St., Paterson, sketches 2 story, basement, 50 x 115 ft., brick, steel, Forrest St. and Ocean Ave., $150,000.

N. J., Garfield—First Presbyterian Church R. W. Key, pastor, 132 Palisades Park, church addition, Palisade Ave. $150,000. Project in abeyance. Noted June 19.

BIDS ASKED

Ill., Wilmette—B. B. Shapiro, engr., 6 North Michigan Ave., taking bids (invitation only) Bahai Temple, 162 ft. high, 202 ft. diam. foundation, 152 ft. diam. at top of 18 steps, 1st story and minarets 45 ft. high, incl. 550 tons structural and 330 tons reinforcing steel, 5,750 bbl. cement, 19,500 ft. glass, rough wire glass for dome and windows on 9 acre tract Sheridan Rd. and Linden Ave., for Research Service, Inc., 1112 Shoreham Bldg., Wash., D. C. $400,000. L. Bourgeois, 536 Sheridan Rd., archt.

Ia., Dubuque — July 19, by Academy of Visitation, Sisters of Visitation, c/o Mother M. Catherine, 4 story, rein.-con., brick, Julien St. and Alta Vista Ave. $180,000. Noted July 10.

Mass., North Attleboro—Grace Episcopal Church, G. E. Osgood, pastor, 100 North Washington St., taking bids 1 and 2 story, basement, brick, stone incl. parish house, plain found., $150,000 or more. Smith & Walker, 80 Boylston St., Boston, archts. Noted June 19.

N. J., Plainfield — July 24, by Delano & Aldrich, archts., 126 East 37th St., New York, general contract 3 story, 85 x 150 ft. church addition, and 3 story, basement, 30 x 65 ft. parish house, brick, stone, steel, plain founds., Crescent and Watchung Aves., for Crescent Avenue Presbyterian Church. $150,000. Noted Jan. 16.

CONTRACTS AWARDED

Conn., Bridgeport — St. John's Episcopal Church, S. F. Sherman, pastor, altering and constructing recreation building, community chapel, cloister connections and parish house addition, all stone, to Hewlett Co., 886 Main St. Est. $150,000 or more. Noted Jan. 23.

Ind., South Bend—Zions Church, general contract 2 story, basement, 30 x 110 ft., brick, stone, steel, Wayne and St. Peter Sts., to H. G. Christman, South Bend. Est. $150,000.

Mass., Marblehead—Unitarian Society, 248 Pleasant St., altering and constructing 3 story, basement, brick parish house addition, plain found., to J. W. Ferris, Inc., 11 Peabody Sq., Peabody. Est. $150,000.

Mass., Saugus—Cliftondale Methodist Church, A. A. Pitman, pastor, 12 Jackson St., 2 story, basement, brick, stone community and parish house, plain found., to E. J. Rappoli, 515 Mass. Ave., Cambridge. Est. $150,000.

SCHOOLS

PROPOSED WORK

Ark., Little Rock—Philander Smith College, G. C. Taylor, pres., sketches by C. L. Thompson, Hall Bldg., rein.-con., brick, stone college on 40 acre tract in southwestern part city. $300,000.

Calif., Pasadena — Pasadena City School Dist. plans by Bennett & Haskell, 1st Trust Bldg., John Muir Technical High School, concrete auditorium, 1,200 seating capacity. $150,000.

Calif., Redondo Beach—Redondo Beach Union High School Dist., plans by Allison & Allison, California Reserve Bldg., Los Angeles, rein.-con. school, shop, gymnasium. $165,000.

Calif., San Francisco—City and San Francisco Co., plans by D. A. Riedy, Pacific Bldg., 2 story, basement, rein.-con., Claremont Blvd. $180,000.

Calif., San Francisco—City and San Francisco Co., sketches Potrero Elementary School, fireproof, $150,000; addition to West Portal Elementary School, $180,000; remodeling and constructing additions to Girls High School, $145,000; addition to Longfellow Elemetary School, $110,000; Bernal Junior High School, fireproof, $600,000; George Washington High School, 30th, 32nd, Geary and Balboa Sts., $1,500,000. Engineer and architect not selected.

Calif., Santa Ana — Santa Ana School Dist. plans by Allison & Allison, Calif. Reserve Bldg., Los Angeles, 2 story, rein.-con. school. $300,000.

Ind., Chesterfield—Spiritualist Assn., plans by E. R. Watkins, Anderson, 3 story, rein.-con., brick college, hotel. $150,000.

Me., York—Town, E. A. Small, supt. schools, altering and constructing 3 story, basement, brick, steel high school addition, plain found. $150,000. Bids in. Project in abeyance. **Maturity spring 1931.** Miller & Beal, 465 Congress St., Portland, archts. Noted June 19.

Mass., Belmont (br. Boston)—Town, J. O. Benton, 2 story, basement, brick school, School St. $200,000.

Mass., Cambridge—Radcliffe College, 10 Garden St., A. L. Comstock, pres., chemistry and physics college building, near college grounds. $400,000. Engineer and architect not selected.

Mass., Medford (br. Boston) — City, A. J. Harty, chn. Building Com., City Hall, sketches by Hutchins & French, 11 Beacon St., Boston, 2 story, basement, brick school, Roberts and Playstead Rds. To exceed $150,000. Noted May 29.

Mass., South Hadley—Town, M. Graham, secy. comn., sketches by M. J. Maloney, 23 Pearl St., Springfield, brick, steel, Granby Rd. $150,000.

Mass., Topsfield—Town, donor, estate of T. E. Proctor, 201 Devonshire St., Boston, revised plans by Adden, Parker, Clinch & Crimp, 177 State St., Boston, 2 story, basement, brick, stone high and grade school, plain found. $200,000. Noted May 2, 1929, under "Buildings—Educational, Religious."

Mass., Townsend — Town, School Comn., receiving sketches, 2 story, basement, brick, stone, Centre St. $150,000. Noted Apr. 3. Engineer and architect not selected.

Mass., Wilmington—Town, School Comn., 2 story, basement, brick, stone high school, $200,000. Engineer and architect not selected.

Schools (Continued)

N. J., Englishtown—Bd. Educ.. Manalapan Twp., plans by J. N. Pierson & Son, 198 Jefferson St., Perth Amboy. 2 story, basement, brick, steel, plain found., Harrison Ave. $150,000.

N. J., Hillside (sta. Elizabeth)—Bd. Educ., H. W. Doremus, pres., Township Hall, sketches by J. Wind, Jr., 1450 North Broad St., 2 story, basement, brick, steel, rein.-con., Winans Ave. and Leslie St. $165,000.

N. J., Keansburg—St. Anne's Roman Catholic School plans by V. J. Eck. 12 Broad St., Red Bank, 2 story, basement. brick, steel, rein.-con., plain found., Carr Ave. $150,000. Noted June 26.

N. J., Leonia—Bd. Educ., High School Bldg., sketches 2 story, basement, brick, steel high school addition, Christie Heights. $150,000. Noted May 29.

N. J., Lyndhurst—Bd. Educ., sketches by Guilbert & Betelle, 20 Branford Pl., Newark, 2 story, basement, brick, steel grade and high school. $500,000.

N. J., Manasquan — Bd. Educ., M. V. Marcellus, pres., sketches 2 story, basement, brick, steel, rein.-con. high school. $350,000. Engineer and architect not selected.

N. J., Newton—Bd. Educ.. High School Bldg., sketches by Hacker & Hacker, 201 Main St., Fort Lee. Junior High School, 2 story, basement, brick, steel. $150,000.

N. J., Orange—Bd. Educ., Central Ave., plans by E. Sibley, 1034 Edgewood Lane, Palisade, 2 story, basement, 160 x 195 ft., brick, steel, rein.-con., plain found., Heywood Ave. $200,000.

N. J., South Orange—Carteret Academy, H. V. Osborne, pres., 317 Carteret Pl., 2 story, basement, brick, steel, plain found., White Oak Ave. $200,000. Engineer and architect not selected.

Pa., Apollo — Bd. Educ. plans by H. M. Rogers, Johnstown Trust Bldg., Johnstown, 3 story, basement, 100 x 125 ft., brick, hollow tile, limestone, rein.-con. high school. $185,000. Vans Eng. Serv., Blairsville, engrs. Noted Apr. 24.

Pa., Erie—Bd. Educ., J. Zurn, pres., Library Bldg., plans by Meyers & Johnson, 821 Commerce Bldg., Edison Grade School, 2 story, brick, East Lake Rd. $185,000.

Pa., Grove City—Grove City College, W. L. Clause, pres. Bd. Trustees, c/o Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, W. L. McEwan, pastor, 906 South Negley Ave., Pittsburgh, plans by W. G. Eckles Co., Law Savings & Trade Bldg., New Castle and soon takes bids 2 story, part basement, 52 x 150 ft., concrete, steel, stone college, church. $150,000. Noted July 3.

Tex., Laredo—Laredo Ind. School Dist., W. P. Galligan, supt., deferred election until early 1931, $350,000, fireproof high school.

Tex., San Antonio—Chaminade College, Society of Mary, Denny Rd., St. Louis, Mo. (owners of St. Mary's University and St. Mary's Academy, San Antonio), plans by L. M. J. Dielmann, archt. and local representative, 306 East Commerce St., 3 story college, probably containing chapel, living quarters. $500,000. Noted June 26.

Tex., San Antonio—Bd. Educ., c/o J. A. McIntosh, Water St., bids after July 25, Senior High School, 2-3 story, rein.-con., 60,000 sq.ft. floor space, plain found., Spanish Acres. $1,000,000. Phelps & DeWees, 618 Gunter Bldg., School Bd. Archts. Adams & Adams, Real Estate Bldg., archts. W. E. Simpson, Co., 942 Milam Bldg., engrs. Noted Apr. 17.

Ont., Toronto—University of Toronto, Queens Park, plans by Craig, Madell & I. R. Loudon, 96 Bloor St. W., 4 story, basement, brick, concrete, steel addition to Mining and Metallurgical Building. $250,000.

Ont., Toronto—Victoria & Emmanuel College, Queens Park, plans by Sproatt & Ralph, 1162 Bay St., and soon takes bids 3 story, basement, stone men's and women's buildings, rein.-con. brick, steel, plain found., Queens Park. $500,000.

BIDS ASKED

Calif., Santa Cruz—July 29, by Bd. Educ., 2 story, rein.-con., Mission type high school. $160,000. J. J. Donovan, 1916 Bway., Oakland, archt.

Conn., Stamford—City, c/o A. H. Emery, Jr., Glenbrook, taking bids 2 story, basement, 60 x 211 ft., brick, steel, concrete school, Franklin St. $300,000. Butler & Provost, 35 Atlantic St., archts.

Ill., Chicago—July 22, by Bd. Educ., 188 West Randolph St., carpentry, plastering, marble, terrazzo, tile, roofing, fireproofing, sheet metal, structural steel, miscellaneous metal, steel, steam heating, plumbing, ventilating, heat regulation, coal and ash conveyor, electrical work, shavings exhaust system for Lane Technical High School, Addison St. and Western Ave. Est. $4,000,000. Former bids rejected. Noted June 26.

Ind., East Orange—Aug. 1, by Bd. School Comrs., brick, steel school. $150,000. C. D. Norris, East Chicago, archt. Noted June 12.

Md., Baltimore—July 23, by Bd. Awards, 2 story, basement, irregular sized, brick, concrete school addition, Rogers Ave., for Mayor and City Council, City Hall. $175,000. C. H. Osborne, 222 West Franklin St., engr. C. N. and N. Friz, Lexington Bldg., archts.

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Mass., Boston—July 24, by Dpt. School Buildings, 11 Beacon St., remodeling 2 story, basement, Mechanics Art High School, Belvedere St.; Dwight School, West Springfield St.; and Wait School, Shawmut Ave., brick. $150,000. Private plans.

Mo., Springfield—July 24, by Bd. Educ., c/o A. R. Stewart, secy., 401 East Central St., Lincoln Colored Grade School, 2 story, basement, 86 x 155 ft., brick, concrete 800 Washington St., $125,000; 1 story, balcony, 84 x 114 ft., brick, concrete, high school, incl. gymnasium, est. $100,000. Hawkins & Nicholas, 406 McDaniel Bldg., and William B. Ittner, Inc., Continental Life Bldg., St. Louis, archts.

Mo., St. Joseph—Aug. 7, by Board Educ., A. L. Loving, secy., Central High School, 2 and 3 story, basement, 258 x 263 x 396 ft., rein.-con., brick, stone. $600,000. Eckel & Aldrich, 1105 Corby Bldg., archt. W. Ittner, Inc., Continental Life Bldg., St. Louis, assoc. archts. W. E. Gillham, 409 Interstate Bldg., Kansas City, engr.

N. H., Portsmouth—July 25, by City, at office F. W. Hartford, mayor, Junior High School, 2 story, basement, brick, stone, steel, concrete, plain found. $300,000. Ashton, Huntress & Alter, 477 Essex St., Lawrence, Mass., archts. Noted May 22.

N. J., Kearny (sta. Arlington)—Myers & Shanley, archts., 24 Walnut St., Newark, taking bids 2 story, basement, brick, steel high school addition, plain found., Chestnut St., for St. Cecelia's Roman Catholic Church, J. Preston, pastor. $150,000. Noted July 10.

N. D., Bismarck—M. H. Atkinson, city aud., paving 7,859 sq.yd. streets, to Haggart Constr. Co., Fargo, $27,000. Noted June 12.

CONTRACTS AWARDED

Calif., San Jose — San Jose School Dist., 1 story, rein.-con., to E. Nommensen, 28 North 1st St., $116,171; heating, to A. J. Peterson, 455 East Washington St., $31,663. Noted June 5.

Calif., San Francisco—City and San Francisco Co., general contract Aptos Junior High School, rein.-con., to McDonald & Kahn, Financial Center Bldg., $529,500; electric wiring, to L. Flatland, San Francisco, $37,332; mechanical work, to F. W. Snook Co., 596 Clay St.; plumbing, to Scott Co., 243 Minna St., $34,987.

Conn., New Haven—Yale University, T. W. Farnam, constr. supt., 4 story, brick, stone, Sterling Hall and medicine building extesnion, to Geo. A. Fuller Co., Fuller Bldg., New York. Est. exceeds $500,000.

Conn., Westport — Town, M. Lefler, supt. schools, 2 story, basement, 68 x 180 ft. and 50 x 50 ft., brick, steel school, incl. manual training department, to Wm. Martin & Son, 164 State St., Bridgeport, $191,200. Noted June 12.

Ind., South Bend—Bd. School Comrs., general contract rein.-con., brick, English architecture, incl. auditorium, gymnasium, Donmoyer and Fellows Sts., to Smoger Lumber Co., 407 Laurel St., South Bend, $281,358. Noted July 19.

Kan., Holton—Bd. Educ., Dist. 2, S. T. Osterhold, secy., 2 story, basement, 78 x 120 ft., rein.-con., brick, high school, to Busboom Bros. Constr. Co., Fairbury, Neb., $102,250. Noted June 19.

Me., Falmouth — Town, J. T. Gyger, supt. Schools, and J. P. Thomas, archt., 537 Congress St., Portland, 2 story, basement, brick, stone high school, plain found., to Henry Plante & Co., 37 Scammon St., Saco. Est. $150,000.

Md., Lock Haven—H. P. Hopkins, archt., 347 North Charles St., Baltimore, 2 and 3 story, 133 x 192 ft., hollow tile, stucco educational and vocational building for Maryland Training School for Boys, to Davis Constr. Co., 9 West Chase St., Baltimore, $125,000. Noted May 8.

Mass., Billerica—Town, M. A. Buck, chn. com., general contract altering and constructing 2 story, basement, brick, stone high school addition, Boston Post Rd., to John W. Duff, Inc., 146 Summer St., Boston; heating and ventilating, to G. E. Soar, 263 Harrison Ave., Boston. Total est. $175,000. Noted July 3.

Mass., Brighton—City of Boston, Dpt. School Buildings, altering and constructing 2 story, basement, brick, stone, steel school addition, Strathmore Rd., to Archdeacon & Sullivan, 5 East Concord St., Boston. Est. $150,000.

Mass., Dennis—G. Chapman, chn. School Building Com., 3 story, basement, 80 x 95 ft., brick, South Dennis Sect., to A. M. Lundberg, Ry. Exch. Bldg., St. Louis, Mo. Est. $150,000. Noted July 3.

Mass., Lowell — St. Louis Roman Catholic Church, J. Labassiere, pastor, 2 story, basement, brick, school, parish hall, plain found., West 6th St., to Z. A. Houle, 53 Central St. Est. $150,000.

Mass., Worcester—City, Schoolhouse Dpt., 3 story, basement, 90 x 115 ft., brick, limestone, steel high school, gymnasium, plain found., to J. P. Keating, 58 Front St. Est. $300,000. Noted June 19.

Mo., Springfield — Bd. Educ., c/o A. R. Stewart, 401 East Central St., general contracts Bailey School, 2 story, part basement, 90 x 153 ft. brick, concrete, Central and Campbell Sts., and Weaver School, 2 story, basement, 112 x 176 ft., brick, concrete, stone, Douglas and Divisions Sts., to J. H. Reddick, Fort Smith, Ark., $170,039. Plumbing in both schools and heating in Bailey School, to J. D. Manley & Co., 514 Cottage St., $14,800 $3,719 respectively; heating in Weaver School, to Elliott Heating Co., 970 Prospect St., $13,017; electrical work both schools, to Electric Equipment Co., 303 South Ave., $6,466.

N. J., Lincoln Park—Bd. Educ., School Bldg., general contract 2 story, basement, 78 x 106 ft., brick, steel, Pine Brook Rd., to J. Barbato & Bros., 100 Westminster Ave., Garfield. Noted June 27.

N. J., Jersey City—Bd. Educ., G. F. Edge, secy., Administration Bldg., Harrison Ave., general contract School 36, 4 story, basement, 78 x 165 ft., brick, steel, rein.-con., plain found., to D'Elia Constr. Co., 972 Newark Ave., $394,000; plumbing, to E. H. Moore, 733 Communipaw Ave., $36,495; heating, to F. P. Farrell, 269 Camden St., Newark, $29,975. Grand total $460,470. Noted June 12.

N. J., New Brunswick—New Jersey College for Women, 109 George St., general contract 2 story, basement, brick, steel recreation building, dormitories, swimming pool, Nichol and Jones Aves., to Highland Park Building Co., 238 Cleveland Ave., Highland Park. Est. $150,000.

N. J., Paterson — Bd. Educ., City Hall, masonry and carpentry contract for school, to Consullo-Burke Constr. Co., 613 15th St., Union City, $334,000; plumbing, refrigeration and sheet metal, to Standard Plumbing & Heating Co., 181 Ellison St., $34,485; heating and ventilating, to F. A. McBride, 327 Grand St., $29,287; electrical work, to W. C. Brown, 31 Fornelius Ave., Clifton, $21,343; steel and iron, to New Jersey Fire Escape & Railing Co., 118 1st Ave., Passaic, $34,987. Grand total $454,102. Noted June 4.

O., Cleveland—Bd. Educ., F. G. Hogen, dir., 6 story, basement, 109 x 281 ft., stone, steel, concrete headquarters building, to Hunkin-Conkey Constr. Co., Newman-Stern Bldg., $1,083,687; heating to Warden & Leese, 2450 Prospect Ave., $53,840. Noted June 5.

O., Delaware — Ohio Wesleyan University, "Stuyvesant Hall" Dormitory, 3 story, basement, brick, stone, steel, concrete, to W. J. Schirmer Co., 1720 Euclid Ave., Cleveland. Est. $350,000.

O., Toledo—Mills, Rhines, Nordhoff & Bellman, archts., Ohio Bldg., 3 story, basement, brick, steel physical education building, Bancroft St., for University of Toledo ,to H. J. Spieker Co., 1418 Elm St., $312,000; plumbing, to Pioneer Plumbing Co., $38,953; electrical work ,to Winter Electrical Co., 136 Woodruff St., $24,624. Grand total $375,577. Noted June 19.

Pa., Corapolis — Felican Sisters, c/o Mary Mother Menonissa, 5th Ave. Extension, McKeesport, steel contract 4 story, basement, 250 x 300 ft., brick, steel, stone hollow tile, training school and Mother house, 3 story, basement, 40 x 100 ft. power house, Montour St., Moon Twp., to W. N. Kratzer Co., 3212 Smallman St., Pittsburgh. Foundation nearing completion. Noted June 6.

Va., Lexington—Virginia Military Institute, U shaped engineering hall, to J. L. Crouse, Greensboro, N. C., $180,000.

Ont., Kingston—Registrar, Queens University, 4 story, basement, 60 x 200 ft., Kingston limestone geology building, to Robertson & Janins, Toronto. Est. $300,000. Noted June 19.

THEATRES

PROPOSED WORK

Mass., New Bedford — State Theatre Corp., B. Zeitz, 674 Purchase St., plans by F. A. Walker, 225 Union St., reconstructing 2 story, brick, steel, concrete theatre. $150,000.

N. H., Manchester — Salem Realty Co., J. Deery, pres., 71 Washington St., Boston, Mass., plans by C. W. and G. L. Rapp, 199 North State St., Chicago, Ill., theatre. Paramount Theatre Corp., Paramount Bldg., New York, lessee.

Pa., Rochester—J. M. De Angelis, archt., 49 East Ave., Rochester, N. Y., soon lets contract 2 story, basement, 80 x 135 ft., brick, steel, hollow tile, 17 x 40 ft. wing, Hinds Dr. near Brighton Ave., for Majestic Amusement Co., 115 Brighton Ave. $500,000. E. Winograd, 365 New York Ave., mgr.

BIDS ASKED

Conn., Torrington—Warner Bros. Pictures, 321 West 44th St., New York, bids about Aug. 1, general contract theatre, T. W. Lamb, 644 8th Ave., New York, archts.

Ill., Chicago—July 25, by J. E. O. Pridmore, archt., 38 South Dearborn St., 1 story, balcony, rein.-con., brick, terra cotta on 108 x 140 ft. site, Western and Devon Sts., for Balaban & Katz, 175 North State St. $500,000. Noted Apr. 19.

Kan., Hutchinson — Aug. 6, by Korabaugh-Wiley Co., owners, and Mann & Co., superv. archts., Hutchinson, and Boller Bros., assoc. archts., 114 West 10th St., Kansas City, Mo., 2 story, basement, 71 x 165 ft., rein.-con., brick, terra cotta, East 1st St. near Main St. Midland Circuit of Theatres, 610 Midland Bldg., Kansas City, lessee. Noted July 3.

N. J., Hackensack—T. W. Lamb, archt., 644 8th Ave., New York, bids about Sept. 15, general contract 2 story, basement, brick, steel, plain found., 220-22 Main St., for Warner Bros. Pictures, Inc., H. M. Warner, pres., 321 West 44th St., New York. Est. $250,000. Noted May 29.

CONTRACTS AWARDED

Calif., Madera—N. and A. Barsotti, brick, incl. stores, Yosemite Ave., to C. Miller, Madera, $165,000.

Theaters (Continued)

N. Y., Astoria (sta. Long Island City)—Loews, Inc., 1540 Bway., New York, general contract theatre, to James McWilliams, Inc., 11 East 44th St.; steel to Bethlehem Fabricators, Inc., 31 Union Sq. Est. $500,000. Noted Mar. 20.

BANKS

PROPOSED WORK

Mass., Brookline — Boulevard Trust Co. of Brookline, W. A. McKenney, pres., soon takes bids on revised plans 1 story, basement, brick, stone, concrete, steel, plain found., Beacon and Harvard Sts., Coolidge Corner. $150,000 or more. J. W. Beal Sons Co., 185 Devonshire St., Boston, archts. Noted May 23, 1929 under "Buildings—Commercial."

Pa., Phila.—Philadelphia Saving Fund Society, J. M. Wilcox, pres., 700 Walnut St., plans by Howe & Lescoze, 414 South 19th St., 3 story, basement, rein.-con., brick, steel, incl. offices, plain found., 12th and Market Sts.

BIDS ASKED

N. J., South Orange — Myers & Shanley, archts., 24 Walnut St., Newark, bids about July 15, general contract altering and constructing 2 story, basement, brick, steel addition, 53 South Orange Ave., for South Orange Trust Co., 53 South Orange Ave. $150,000. Noted July 10.

CONTRACTS AWARDED

Me., Rumford—Rumford National Bank, 115 Congress St., 1 story, basement, brick, steel concrete, concrete found., Congress St., to J. H. Kerr, Prospect Ave. Est. $150,000.

Mass., Framingham—Framingham Natl. Bank, F. L. Oakes, pres., 1 story, basement, brick, stone, concrete, steel, plain found., to L. R. Porter Co., 156 Stuart St., Boston. Est. $150,000. Noted June 19.

Mass., Woburn—Woburn Five Cents Savings Bank, E. E. Silver, pres., 10 Pleasant St., 2 story, basement, brick, stone, concrete, steel, marble, plain found., to L. R. Porter Co., 156 Stuart St., Boston. Est. $150,000. Noted June 19.

R. I., Providence — Rhode Island Hospital Trust Co., 15 Westminster St., 2 story, basement, brick, steel, concrete branch bank, concrete found., Westminster St., to A. W. Merchant, Inc., Hospital Trust Bldg. Est. $150,000. Noted June 26.

Va., Richmond — Taylor & Fisher, archts., Baltimore Bank Bldg., Baltimore, Md., 7 story, basement, 70 x 113 ft., brick, steel, limestone, granite, hollow tile, to J. A. Jones Constr. Co., Commercial Bank Bldg., Charlotte, N. C., for Federal Reserve Bank of Richmond, 9th and Franklin Sts. $600,000. Noted June 19.

OFFICES

PROPOSED WORK

Ind., Terra Haute — Indiana Bell Telephone Co., 256 North Meridian St., plans by Vonnegut, Bohn & Mueller, 610 Indiana Tr. Bldg., Indianapolis, 4 story, basement, rein.-con., brick, stone, Ohio and 7th Sts. $200,000.

N. J., Matawan—Matawan Properties, Inc., 135 Main St., 2 story, basement, brick, steel, incl. stores, plain found. $150,000.

BIDS ASKED

N. J., Palisades Park—Owner, c/o P. J. Jossier, archt., 240 Broad Ave., taking bids on separate contracts 2 story, basement, brick, steel, incl. stores, apartments, Broad Ave. $150,000. Noted July 10.

CONTRACTS AWARDED

Mass., Boston—United Shoe Mchy. Corp., 140 Federal St., remodeling 14 story, basement office, Federal St., to A. MacDonald & Sons, 45 Bloomfield St. Est. $150,000 or more.

N. J., East Orange—Main & Munn Corp., general contract 2 story, basement, 64 x 170 ft., incl. apartments, Main St. and Munn Ave., to Turner Constr. Co., Graybar Bldg., New York. Noted June 27.

STORES

PROPOSED WORK

Calif., Los Angeles—F. and W. Grand Co., 337 Bway., Los Angeles, sketches by Walker & Eisen, Western Pacific Bldg., 6 story, basement, rein.-con., Bway. near 5th St. To exceed $250,000.

N. J., Jersey City—A. Cordano, c/o M. A. Wolf, archt., 845 Broad St., Newark, 3 story, basement, brick, steel, rein.-con., incl. apartments, Manhattan and Terrace Aves. $150,000.

N. J., Lyndhurst—Owner, c/o P. J. Jossier, archt., 240 Broad Ave., Palisades Park, sketches 2 story, basement, 90 x 100 ft., brick, steel, incl. apartment. $150,000.

N. J., Newark—W. W. Oppenheim, Inc., 657 Broad St., plans by Myers & Shanley, 24 Walnut St., 1 story, basement, 60 x 190 ft., brick, steel addition, plain found., 657-59 Broad St. $150,000. F. W. Woolworth Co., 661 Broad St., lessee. Noted July 10.

BIDS ASKED

N. J., Paterson — Owner, c/o E. R. Coe, archt., 136 Washington St., bids about Aug. 1, general contract 3 story, basement, 75 x 120 ft., brick, steel, incl. apartments. $150,000. Noted July 10.

CONTRACTS AWARDED

Conn., Torrington—W. W. Mertz, 84 Main St., altering and constructing 2 story, basement, 110 x 115 ft., brick, stone, concrete, steel department store addition, plain found., to Tracy Bros. Co., 52 Benedict St., Waterbury. Est. $160,000. Noted June 5.

LOFTS

PROPOSED WORK

Ont., Toronto—Spadina Investments, Ltd., c/o B. Brown, archt., 600 Bay St., 15 story, basement, 100 x 141 ft., concrete, steel, stone, Spadina Ave. $250,000.

PUBLIC

PROPOSED WORK

Calif., San Francisco—WAREHOUSE—City and San Francisco Co. warehouse, probably rein.-con., 15th St. and Treat Ave. $150,000. Engineer and architect not selected.

Calif., Tehachapi—PRISON—State of California plans by G. B. McDougall, P. Wks., Bldg., Sacramento, fireproof womens prison, Cummings Co., $300,000, steam plant $30,000, sewerage system $50,000.

Calif., Yountville—SOLDIERS HOME—State of California plans by B. G. McDougall, Pub. Wks. Bldg., Sacramento. Class A, building. $650,000.

Ind., Newcastle — ASYLUM — Village of Elileptics plans by Foltz, Osler & Thompson, 704 F. W. Wild Bldg., Indianapolis, rein.-con., brick, steel. $150,000.

Ind., North Madison — ASYLUM — Madison State Hospital plans by Foltz, Osler & Thompson, 704 F. W. Wild Bldg., Indianapolis, rein.-con., brick, steel, stone. $150,000.

Md., Hagerstown — PENITENTIARY — S. S. Janney, chn., State Bd. Welfare, Union Trust Bldg., plans by W. H. Emory, Baltimore Trust Bldg., and Buckler & Fenhagen, 323 Charles St., 4 story, stone, rein.-con. $6,000,000. Whitman, Requardt & Smith, Baltimore Trust Bldg., engrs.

Mass., Nantucket—OFFICE—Town Bd. Selectmen receiving sketches town and county office building, Federal St. $150,000. Engineer and architect not selected.

Mass., Newton—CITY HALL—City, S. Weeks, mayor, sketches by Allen & Collens, 75 Newbury St., Boston, city hall, Commonwealth Ave., Walnut and Homer Sts. $1,000,000. Noted Apr. 3.

Mass., North Adams — ARMORY — Commonwealth of Massachusetts, Armories Division, State House, Boston, sketches by McLaughlin & Burr, 88 Tremont St., Boston, state armory, Ashland and Porter Sts. To exceed $150,000.

Mich., Grand Rapids—AUDITORIUM—City plans by Robinson & Campau, Grand Rapids, 2 story, basement, brick, steel, stone, plain found. $1,500,000. Noted Apr. 17.

Pa., Phila.—COURT—Bd. Comrs. Philadelphia Co., City Hall, plans by J. J. Windrim, Commonwealth Bldg., municipal court building, 18th and Vine Sts. $3,000,000.

BIDS ASKED

Calif., Los Angeles—Aug. 5, by State Dpt. Pub. Wks., Associated Realty Bldg., 12 story, basement, steel, rein.-con., in Civic Center. To exceed $150,000.

Conn., Middletown — DORMITORIES — July 21, by Lone Lane Farm, Babcock St., three 2 story, brick, steel dormitories, Lone Lane. $150,000. Towner & Sellow Associates, 363 Main St., archts. Noted July 10.

Ind., Crawfordsville—INFIRMARY—July 21, by Bd. Comrs. Montgomery Co., 2 story, basement, 140 x 140 ft., brick, steel. $150,000. C. Beeson, Crawfordsville, archt.

Ind., Knightstown — ORPHANS HOME — Aug. 1, by Orphans Home Indiana Soldiers & Sailors, brick, steel girls dormitory. $150,000. McGuire & Shook, 941 North Meridian St., Indianapolis, archts.

N. J., Woodbine—DORMITORY—July 28, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract 3 story, basement, brick, steel, dormitory for feeble minded males colony, plain found. $150,000. Division of Architecture & Constr. (C. N. Leathem) State Office, Bldg., Trenton, archts.

N. C., Roxboro—COURTHOUSE, etc.—Comrs. Pearson Co., bids about Aug. 1, 3 story, basement, fireproof courthouse and jail. $150,000. C. Hartman, Jefferson St. Bldg., archt.

Tex., Beaumont — COURTHOUSE — Comrs. Jefferson Co., B. B. Johnson, judge, bids about July 20, general contract 8 story, basement, 110 x 170 ft., brick, steel, rein.-con., plain found. $1,000,000. A. Babin, 417 Perlstein Bldg., and F. C. Stone, 1103 Goodhue Bldg., archts. Noted June 12.

CONTRACTS AWARDED

Mass., Belmont—POLICE STATION—Town Bd. Selectmen, 1 and 2 story, basement, brick, steel police station, concrete found., Concord Ave., to S. Alcock, 21 Leonard St. Est. $150,000. Noted June 19.

Mass., Brighton (sta. Boston) — COURT HOUSE—City of Boston, Dpt. P. Buildings, 2 story, basement, rein.-con., granite addition, concrete found., to P. J. Cantwell, 6 Dakota St., Dorchester. Est. $160,000. Noted June 26.

Mass., Plymouth — POLICE STATION and COURT HOUSE—Comrs. Plymouth Co., altering and constructing 2 story, basement, brick, stone, steel additions, plain founds., to W. & L. Eng. Corp., 694 Washington St., Boston. Est. $150,000. Noted May 29.

Minn., Minneapolis—WORKHOUSE—Bd. P. Welfare, 309 City Hall, general contract three 3 story, basement, rein.-con., brick buildings, Parkers Lake, near here, to National Contg. Co., 2144 Foshay Tower. $385,100. Noted May 22.

Neb., Lincoln — CAPITOL — State Building Comn., general contract last sect. capitol building, to W. J. Assenmacher Co., 625 North 17th St., $745,216; steel work to Omaha Steel Wks., 609 South 48th St., Omaha, $39,500; heating, plumbing, ventilating, to Newberg & Bookstrom, 1338 M St., $34,500; electrical work to Schricker Electric Co., 1800 Euclid St., $45,150. Grand total $864,366. Noted May 29.

N. Y., Mineola—JAIL—Bd. Superv. Nassau Co., additional cells at county jail, to J. D. Cosgrove, 22 School St., Glen Cove. $219,000. Noted June 26.

Ont., Ottawa—LABORATORY—S. E. O'Brien, secy. Dpt. P. Wks., ore dressing and metallurgical laboratory, to A. Garvock, Sparks St., $103,000. Noted Oct. 31.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

Mass., Lynn—HOME—Home of Aged Men, E. B. Fraser, in charge, 34 Forest St., plans by C. L. Betton, 31 Exchange St., 3 story, basement, brick, plain found., Forest and Grove Sts. $150,000.

N. J., Middletown—EXCHANGE—New Jersey Bell Telephone Co., 540 Broad St., Newark, sketches by H. B. Brady, Inc., 333 North Broad St., Elizabeth, 2 story, brick. $150,000.

Tenn., Memphis — BUS TERMINAL — Union Bus Terminal Corp., plans by A. F. Hansen, Shrine Bldg., 2 story, glassed arcade from facade, restaurant, loading platform, South Main St. $250,000. Pickwick-Greyhound Lines, 205 South 2nd St., F. B. Archer, dist. passenger agt., and Lone Star Stages, lessee. Noted Mar. 13.

Ont., Ottawa — MAUSOLEUM — Beechwood Cemetery Co. Ltd., Elgin St., soon takes bids stone mausoleum. $200,000. W. Ralston, Windsor, engr.

BIDS ASKED

Ind., Franklin—MASONIC HOME—Aug. 1, by Masonic Home, brick, steel boys dormitory. $150,000. McGuire & Shook, 941 North Meridian St., Indianapolis, archts. Noted June 19.

Mass., Lawrence — STATION — July 25, by Boston & Maine R.R. Co., W. J. Backes, ch. engr., Boston, 1 and 2 story, brick, stone, granite, steel, concrete found. $250,000. Ashton, Huntress & Alter, 447 Essex St., Lawrence, archts.

N. Y., Buffalo—MARKET—July 21, by New York Central R.R., B. F. Freeman, ch. engr., New York, 70 x 300 ft. and 135 x 300 ft., rein.-con., brick market buildings, Elk St. Excavating 30,000 sq.yd., to M. L. Rupp, 46 Haven St., at $0.55 per sq.yd.

CONTRACTS AWARDED

Conn., Waterbury—BUSINESS—Williams & Brown, Inc., 19 South Main St., 3 story, basement, brick, concrete, limestone, steel, plain found., East Main and South Main Sts., to L. B. Cadario & Son, 260 Tremont St., Boston, Mass. Est. $500,000. Noted June 12.

Ill., Chicago—TRANSPORTATION—Chicago 1933 World's Fair Assn., 160 North La Salle St., R. C. Dawes, pres., general contract 2 story, 145 x 1,000 ft. and 2 domes, each 125 ft. high, 188 ft. interior diam., fabricated in gleaming metal, also towers, minarets, swaying chains, near 31st St. in Grant Park, to John Griffiths & Son Co., 228 North La Salle St. Est. $1,000,000. Noted May 15.

Mass., Greenfield—EXCHANGE—New England Telephone & Telegraph Co., 245 State St., Boston, 3 story, basement, brick, concrete, steel, concrete found., to T. J. Gass Co., 191 Main St. Est. $150,000. Noted June 26.

N. Y., Buffalo—MARKET—See "Bids Asked."

N. Y., New York—PUBLISHING—Starrett Brothers & Enken, Inc., 101 Park Ave., will build 26 story publishing building, 326-46 West 42nd St. Raymond Hood, Godley & Fouilhoux, 40 West 40th St., archts. Lockwood, Greene Engineers, Inc., 100 East 42nd St., engrs. McGraw-Hill Publishing Co., Inc., 10th Ave. at 36th St., lessee.

Okla., Oklahoma City — GARAGE — Eisele Motor Co., 201 West 10th St., 2 story, 95 x 190 ft., steel, plain found., 10th St., to J. A. Werme, 510 North Indiana St., $150,000.

Pa., Phila.—FILM EXCHANGE—E. J. Swales, Bailey Bldg., 2 story, basement, 67 x 100 ft., rein.-con., brick, steel, plain found., Summer and Winter Sts., to W. M. C. Smelo, Bankers Trust Bldg., Metro Goldwyn Meyer Film Exch. Co., lessee.

Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Oakland—FACTORY—Margaret Burnham Candy Co., 3800 Piedmont Ave., plans by G. Koster, 2355 Leavenworth St., San Francisco, 2 story, rein.-con., 46th Ave. and Telegraph St.

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Factories and Mills (Continued)

Ill., Chicago—FACTORY—Hess Warming & Ventilating Co., 1207 South Western Ave., plans by W. H. Tomlinson, Joliet, new plant and remodeling present building. $125,000.

Mass., West Springfield (br. Springfield)—PRINTING PLANT—Strathmore Paper Co., L. R. Howes, in charge, revised plan 2 story, brick, concrete, plain found. $150,000. Private plans. Noted Oct. 1.

N. J., Union City—DAIRY PLANT—Consumers Dairy Co., 400 45th St., plans by G. Willaredt, 411 23rd St., West New York, 2 story, basement, 28 x 155 ft., brick, steel addition, New York Ave. and 45th St. $45,000. Noted July 10.

Pa., Chester—NEWSPAPER PLANT—Ballinger Co., archts., 12th and Chestnut Sts., soon lets contract 3 story, basement, 62 x 118 ft., brick, steel, plain found., Welsh and Sproul Sts.

Pa., Pittsburgh—REFINERY—Gulf Refining Co., Frick Bldg., Annex 21 State St., refinery, incl. brick, concrete bulk buildings, steel tanks, equipment, railroad siding, on 120 acre tract at Neville Island. $1,500,000. H. Henderson, Frick Building Annex, 21 State St., engr.

Tenn., Memphis — DAIRY and ICE CREAM PLANT — Clover Farm Dairy Co., 2 story, brick addition, incl. auditorium, recreation room, garage, Beale Ave. and Manassas St. $55,000. T. H. Allen, McCall Bldg., engr.

Wash., Seattle—ASSEMBLY PLANT—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., plans by Albert Kahn, Inc., 1004 Marquette Bldg., Detroit, Mich., 100 x 320 ft. assembly plant, 100 x 500 ft. warehouse, power and oil houses, on West Waterway. $3,000,000.

Wis., Milwaukee—DYE PLANT—G. Schley & Sons, archts., 425 East Water St., soon lets contract, 1 story, 150 x 280 ft., brick, stone, Capitol Dr., for Novelty Dye Wks., 375 Jefferson St. Noted July 10.

Ont., Toronto—CANDY FACTORY—Jenny Lind Candy Co., Ltd., c/o E. G. Robinson, 1010 Star Bldg., soon lets contract, 5 story, basement, 53 x 112 ft., brick, rein.-con., marble, tile, brick, $85,000. J. A. Thatcher, 37 Cowan Ave., archt. Noted June 19.

BIDS ASKED

Calif., Live Oak—PACKING PLANT—Walnut Growers Assn., N. F. Todd, pres., taking bids 1 story, basement, 90 x 120 ft., processing and warehousing plant. $45,000.

Calif., Los Angeles — BAKERY — **Van de** Kamps Holland Dutch Bakers, San Fernando Bldg., taking bids 2 story, 230 x 280 ft. rein.-con., Fletcher Dr. $250,000. McCormick Co., 41 Park Row, N. Y., archts.

Mass., Jamaica Plain (sta. Boston)—LAUNDRY—R. A. Skoagland, 34 Elm St., taking bids 1 story, iregular sized, concrete, steel, plain found., 116 Brookside Ave. $40,000. Private plans.

Miss., Laurel—FACTORY—See "Contracts Awarded."

Mo., St. Louis — PACKING PLANT — See "Contracts Awarded."

N. H., Dover—ICE PLANT—Parle Ice & Coal Co., Kirkland St., taking bids altering and constructing 2 story, brick ice manufacturing plant addition, Kirkland St. $40,000. A. W. K. Billings, Jr., 80 Boylston St., Boston, Mass., archts.

N. J., Jersey City—FACTORY—B. Singer, archt., 921 Bergen Ave., bids about Aug. 1, general contract 2 story, basement, 45 x 140 ft., brick, steel, rein.-con., foot Crawford St., for Jersey City Ladder Co., Inc., 677 Montgomery St. Est. $40,000. Noted June 12.

O., Cleveland—SERVICE—July 30, by State, H. H. Griswold, dir. P. Welfare, Columbus, 1 story, 66 x 124 ft. brick, steel, concrete cold storage, storeroom, kitchen and bakery building, 2 story, basement, 100 x 100 ft. laundry building, equipment, Canal Rd. $150,000. T. R. Ridley, Hartman Hotel Bldg., Columbus, archt.

R. I., Auburn — MANUFACTURING — Universal Winding Co. taking bids 3 story, 60 x 120 ft., brick, steel, plain found. To exceed $40,000. Private plans.

Ont., Ottawa—DAIRY—Clarks Dairy Ltd., Bronson Ave., taking bids brick, rein.-con., dairy, plain found., Bronson Ave. $50,000. F. F. Saunders, 116 Concord Ave., Toronto, archts.

CONTRACTS AWARDED

Conn., Ansonia — PLANT — Farrell Birmingham, Inc., 30 Main St., altering and constructing brick, steel addition, to Tracy Bros. Co., 52 Benedict St., Waterbury. Est. $40,000. Noted June 12.

Conn., New Haven—PLANT—National Folding Box Co., James St., brick addition, to E. & F. Constr. Co., 94 Wells St., Bridgeport. Est. $40,000 or more.

Conn., Torrington—PLANT—Hotchkiss Bros. Co., Water St., 1 story, 50 x 150 ft., brick, steel top addition, Water St., to Torrington Building Co., 182 Church St. Est. $40,000.

Ind., Logansport—PLANT—R. B. M. Mfg. Co., brick, steel addition. $40,000. Owner builds. Private plans.

Mass., Boston—BOTTLING PLANT—Coleman & Keating, 112 Sudbury St., 2 story, basement, 95 x 100 ft., brick, concrete, steel, plain found., Columbus Avenue Extension, to R. J. Gauvreau & Co., 11 Beacon St. Est. $50,000.

Mass., Chicopee—REFINERY—A. G. Spaulding & Co., 1 story, 60 x 200 ft., brick, steel, plain found., to W. A. Newton Co., Mill River Lane, Springfield. Est. $40,000-$50,000.

Mass., Everett—CONTACT—Merrimac Chemical Co., 1 story, brick, steel contact building, to Aberthaw Co., Chemical Lane, Boston, $60,000.

Miss., Laurel — FACTORY — C. P. Limbert Furniture Co., Holland, Mich., 1 story, concrete, brick, L-shaped, 100 x 1,000 ft. sub-contracts basis under supervision L. A. Gily, Laurel. $175,000. E. G. Freebach, Laurel, archt.

Mo., Kansas City—FACTORY—Whitaker Battery & Supply Co., 2463 Charlotte St., 1 story, 160 x 188 ft., brick, rein.-con., to Morris Hoffman, 609 Victor Bldg. Est. $75,000.

Mo., St. Joseph—SEED PLANT—Mitchellhill Seed Co., St. Joseph, 5 story, basement, 50 x 83 ft., brick, steel, rein.-con., stucco, Sylvanie and 2nd Sts., to Peterson Constr. Co., 620 Pioneer Trust Bldg., Kansas City.

Mo., St. Louis—PACKING PLANT—Amer. Packing Co., 3842 Garfield Ave., 3 story packing plant addition, separate contracts. Koerner Eng. Co., 1601 Syndicate Trust Bldg., engrs. and archts.

N. H., East Jaffrey — TACK FACTORY — United Shoe Mchy. Co., C. A. Johnson, supt., 2 story addition, to A. Knight, Stratton Rd., Jaffrey. Est. $50,000.

GARAGES

PROPOSED WORK

Calif., Redwood City — See "Shops and Foundries."

N. J., Plainfield—W. E. Lehman, archt., 972 Broad St., Newark, soon lets contract 1 and 2 story, basement, brick, steel, rein.-con. garage, office, plain found., for Aetna Realty Co., 972 Broad St., Newark. $150,000. Noted July 13.

Pa., Phila.—Philadelphia Saving Fund Society, J. M. Wilcox, pres., 70 Walnut St., plans by Howe & Lescoze, 414 South 19th St., 12 story, rein.-con., brick, steel, plain found., 1201-09 Filbert St.

BIDS ASKED

Ia., Harlan—July 22, at office R. R. Rogers, maintenance supt., 34 x 110 ft. tile garage. L. M. Martin, Non Pareil Bldg., Council Bluffs, engr.

Mass., Brockton—Eastern Massachusetts Street Railway Co., 38 Chauncey St., Boston, taking bids converting 1 story, brick car barn into bus garage, Torrey St. $40,000-$50,000. Private plans. Noted June 26.

Mass., Dorchester (sta. Boston)—See "Contracts Awarded."

Pa., Oil City—Cities Service Co., C. Kinder, mgr., Titusville subsidiary Crew Levick Co., Elverson Bldg., Phila., taking bids 1 story, 26 x 51 ft., brick, hollow tile, concrete service station, Main and Petroleum Sts. $40,000. Private plans. Noted June 5.

CONTRACTS AWARDED

Calif., Los Angeles — FEED MILL — Taylor Milling Corp., 1520 San Fernando Rd., 1 story, 52 x 55 ft., rein.-con., steel, 165 ft. high, 1520 San Fernando Rd., to Burrell Eng. & Constr. Co., 458 Roosevelt Bldg., $50,000.

Mass., Cambridge—W. Galvin, 30 Brattle St., 1 story, 65 x 90 ft., brick, steel, concrete service garage, 15-17 Bennett St., to J. J. Powers Co., 33 Myrtle St. Est. $40,000. Noted June 19.

Mass., Dorchester (sta. Boston)—H. K. Noyes & Son, 857 Commonwealth Ave., Brighton, 1 story, rein.-con., steel auto sales and service station, concrete found., 70 Talbot Ave., separate contracts. $40,000. Private plans.

Mass., Marblehead—Town, Electric Light Dpt., 2 story, stone, steel, tile service building, plain found., to Pitman & Brown, 11 Washington St., Salem. Est. $40,000. Noted July 3.

O., Cincinnati—Weil & Hodesh, c/o Rendigs, Panzer & Martin, archts. and engrs., Southern Ohio Bank Bldg., 7 story, basement, 100 x 111 ft., brick, rein.-con. garage, plain found., 7th St., to Parkway Constr. Co., Provident Bank. $200,000.

POWER PLANTS

PROPOSED WORK

Conn., Hartford—Hartford Electric Light Co., 226 Pearl St., plans by W. T. Marchant, 36 Pearl St., brick, steel, concrete power substation, Park St. Est. exceeds $40,000, incl. equipment.

Oklahoma — Grand Hydro-Inc., c/o W. E. Hudson, pres., Ritz Bldg., Tulsa, having plans prepared hydro-electric development on Grand River. Bids about September. Fargo Eng. Co., Jackson, Mich., engrs. Noted Dec. 19.

Okla., El Reno—City light and power plant. $450,000. J. H. Binder, city mgr.

Ontario — Hydro-Electric Power Comn., 190 University Ave., installing three 1000 kva. transformers, at power plant, Barrie; increasing from 100 kva. to 450 kva. at Fennels Corners; 300 kva. substation and equipment at Painswick; 300 kva. substation and equipment at Utterson; 50 kva. substation and equipment at Fergusonvale; 1500 kva. transformer at Hespeler; 450 kva. substation at Thorold. $50,000. F. A. Gaby, c/o owner, ch. engr.

Ont., Toronto—Hydro Electric Power Comn. of Ontario, 190 University Ave., 220,000 volt sub-station for Chats Falls power plant on Ottawa River; also will probably add sufficient capacity at Leaside Station. $1,500,000. F. A. Gaby, c/o owner, engr.

BIDS ASKED

Mass., Quincy—Owner, c/o Miller & Levi, archts., 46 Cornhill, Boston, taking bids 1 story, 75 x 130 ft., brick, steel, boiler plant agency building, plain found., Federal St. $50,000.

Mich., Ionia—July 24, by State Administrative Bd., 202 State Office Bldg., Lansing, furnishing, installing 300 hp. bent tube type boiler complete with brickwork, stoker, breeching and piping for power house at Ionia State Hospital. D. C. Milbourn, Lansing engr.

Mo., Chillicothe—Aug. 5, by City, 1,500 kw. turbine, surface condenser and 25 kw. turbine driven exciter. E. E. Harper, 4010 Pennsylvania Ave., Kansas City, consult. engr.

O., Cincinnati—Dpt. P. Welfare, 9th and Oak Sts., Columbus, taking bids four 300 hp. boilers, one 150 kw. and two 200 kw. engine generators, other equipment for new power plant at Longview State Hospital.

CONTRACTS AWARDED

Connecticut — Connecticut Power Co., 185 Church St., New Haven, 1 story power substation in Hamden and West Haven, to National Constr. Co., 152 Temple St., New Haven. Est. $40,000 or more.

Conn., Hartford—Hartford Electric Light Co., 266 Pearl St., brick, steel, concrete power substation, Market St., to Industrial Constr. Co., 721 Main St., $29,500.

Mass., North Reading — Commonwealth of Massachusetts, Dpt. P. Wks., Boston, altering and equipping 1 story, brick, power house at State Sanitarium, to Acme Heating & Ventilating Co., 13 Hawkins St., Boston. Est. $40,000.

Mass., Woburn—See "Unclassified."

Mich., Detroit—Public Lighting Comn., 174 East Atwater St., steel extension to substation, Joy Rd. site, to Lendzon Constr. Co., 5765 Chene St. $26,648. Noted Apr. 10 under "Power and Lighting."

N. J., Hackettstown—F. Wentworth, archt., 140 Market St., Paterson, general contract 1 story, basement, brick, steel boiler house, to James Mitchell, Inc., 26 Jounal Sq., Jersey City, for Centenary Collegiate Institute, Church St. Est. $40,000. Noted June 18.

N. J., Secaucus—Hudson Co., Court House, Jersey City, general contract 1 story, basement power house at Contagious Diseases Hospital Grounds, to De Riso Constr. Co., 921 Bergen Ave., Jersey City, $40,944; heating and equipment, to E. J. Wohrle, Tube Concourse Bldg., Jersey City, $47,200. Noted July 10.

S. D., Yankton—Yankton College, c/o G. W. Nash, pres., 2 story, 48 x 56 ft. heating plant, with 100 ft. brick chimney, to S. W. Jonason, Aberdeen, S. Dak., $22,570; plumbing and heating, to James Ferris & Son Co., Sioux Falls, $48,020.

Ont., Toronto—Hamilton Bridge Wks., General Assurance Bldg., brick, steel power plant in connection with structural steel plant, to Anglin Norcross Ltd., Temple Bldg. Owner erects structural steel. Est. $50,000.

SHOPS AND FOUNDRIES

PROPOSED WORK

Calif., Redwood City—MACHINE SHOP, etc.—Pacific Gas & Electric Co., 245 Market St., San Francisco, machine shop, warehouse crossarm plant, garage. Private plans.

Colo., Pueblo—SHOPS—Bd. Comrs. Pueblo Co., W. Barber, clk., rebuilding 1 story, basement, concrete, brick and steel shops, West 29th St. and Baker Blvd. destroyed by fire. $50,000. C. A. Reese, co. engr.

CONTRACTS AWARDED

Mass., Everett—MACHINE SHOP—Merrimac Chemical Co., Chemical Lane, 1 story, brick, steel, plain found., to J. F. Griffin Co., 250 Stuart St., Boston. Est. $40,000.

Pa., Pittsburgh—FOUNDRY—Reliance Steel Castings Co., 28th and Smallman Sts., furnishing, erecting steel for 2 story, 50 x 60 ft., 29th and Smallman Sts., to McClintic Marshall Co., Oliver Bldg., Pittsburgh.

WAREHOUSES

PROPOSED WORK

Calif., Redwood City — See "Shops and Foundries."

Calif., San Pedro—Crescent Wharf & Warehouse Co., Bert 233, plans by J. C. Longueville, 1616 Chelsea Rd., San Marino, 4 story, 100 x 100 ft., rein.-con., Ocean Ave.

Calif., Watsonville — Apple Growers Cold Storage Co., sketches 1 story, 75 x 100 ft., rein.-con. addition to cold storage plant, Beach Rd. $70,000. Gay Eng. Co., 2650 Santa Fe Ave., Los Angeles, engrs.

Mo., Kansas City—Pittsburgh Plate Glass Co., 5th and Wyandotte Sts., 1 story, 162 x 350 ft., rein.-con., brick, incl. office, 12th St. and Burlington Ave. W. R. Bovard, 907 Orear Leslie Bldg., archt. Maturity in 1931. Noted June 19.

Ont., Schumaker—McIntyre Porcupine Mines Ltd., Standard Bank Bldg., Toronto, 2,000 ton, concrete, steel mill, incl. milling, concentrating equipment, electric power, near site of present mill. $500,000. Private plans.

BIDS ASKED

Calif., Live Oak—See "Factories and Mills."

See proposal advertising on page 129